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EDWIN DUNKIN, F.R.S., President, in the Chair.

Professor W. Steadman Aldis, M.A., University College, Auckland, New Zealand;

Lieut. Henry Edward O'Neill, R.N., Mozambique; and

William Peck, 6 Hanover Street, Edinburgh;

were balloted for and duly elected Fellows of the Society.

On the Proposed Change of the Astronomical Day. By Professor Theodor von Oppolzer.

As my views differ in some points from those which Professor Newcomb has given on page 122 of this volume of the *Monthly Notices*, I avail myself of the occasion to state in a few lines my own views on this subject. I fully agree with Professor Newcomb that the universal day will prove a great convenience, and I even think that its use will not remain limited to the reckoning of physical and meteorological phenomena, but that the time will come before long when it will be possible to introduce it, not only as railway and telegraph standard time, but as the regulator of everyday life—a hope which Mr. Sandford Fleming has so well expressed at the conference held at Washington, that I will repeat his own words. "The intelligence of the people will not fail to discover before long that the adoption of correct principles of time-reckoning will in no way change or seriously affect the habits they have been accustomed to. It will certainly sweep away nothing valuable to them. The sun will rise and set to regulate their social affairs; all

classes will soon learn to understand the hour of noon, whatever the number on the dial, whether six as in scriptural times, or twelve or eighteen or any other number. People will get up and retire to bed, begin and end work at the same periods of the day as at present, and our social habits and customs will remain without a change, depending as now on the daily returning phenomena of light and darkness." For such purposes, for the wants of civil life, the present astronomical day of Greenwich is out of the question, as the change of date would, throughout all Europe, coincide with the busiest hours of the natural day, whilst by the adoption of the Greenwich civil day, as proposed by the conference, the change of date at noon (a very inconvenient thing) takes place only in some islands of the Pacific ocean. So this day, beginning at Greenwich mean midnight, seems to me to be the only one practicable for serving as a universal standard of time. But when once such a universal time is introduced for all purposes, it is quite natural that the question must arise if there is indeed so great a necessity to retain in astronomy, and only in astronomy, a different reckoning of time. I fail to see this necessity, and I do not think that it would cause any serious trouble or confusion if a change were to be made in our astronomical reckoning, whilst a special mode of reckoning time in one science only, when all others use the generally adopted standard, will, without doubt, be a source of error and confusion. It is true that the astronomical and civil reckonings do not now agree, and that we are so accustomed to this circumstance that it but rarely leads to error. But nowadays one is obliged, when seeing an indication of an hour, to ask immediately to what meridian it belongs; we are accustomed to bear constantly in mind that there are as many times as there are meridians, and so we naturally also take heed if it is astronomical or civil time. But when we have ceased to ask on which meridian an indication of time is based, when we have learned to consider time as a given, absolute quantity, independent of locality, we may sometimes forget that there exists a special astronomical time. It is not quite right that astronomical ephemerides should form a department by themselves; they are used not only by seamen (and, for instance, in the United States navy the day is reckoned from midnight, as Rear-Admiral Rodgers states on page 176 of the Protocols of the Proceedings of the Prime Meridian Conference), but also for all sorts of calendars and other publications destined for general use, so that the difference of twelve hours may often lead to serious misunderstandings. So, for instance, when the date of an eclipse is given in astronomical reckoning, the historian, who has nearly always to do only with eclipses happening in Europe, Asia, and Northern Africa, will often find that the eclipse was a day earlier than the day which is spoken of in history, and that it happened on Sunday, whilst the records speak of a Monday.

The discontinuity which will arise from the adoption of universal time in the astronomical ephemerides would for all other publications than the *Nautical Almanac* be the same if Greenwich astronomical time were to be adopted; so, for instance, the *Connaissance des Temps*, the *Berliner Jahrbuch*, &c., will not suffer a greater discontinuity on the introduction of universal than on that of Greenwich astronomical time; and when all other publications are obliged to make a change in their reckoning, I do not see why it should be so very objectionable that the *Nautical Almanac* itself should also make a change. The astronomer of 20 or 100 years hence will not want to "bear it in mind" which reckoning of time is adopted for the given epoch, for every page of the ephemeris he is making use of will tell it him, if care is only taken, when the change is adopted in the *Nautical Almanac*, and when it passes from Greenwich time to universal time, to change also the heads of the columns, and to write instead of "mean Greenwich time," "universal time," thus clearly indicating which reckoning is employed. I entirely agree with Professor Newcomb that the data on page ii of the month should be given for Greenwich midnight instead of Greenwich noon, and that the sidereal time should be that for Greenwich midnight; also the columns on page iv should be interchanged, and the hours on pages v to xviii reckoned from midnight. But I think further that these columns should no longer bear the heading "mean Greenwich midnight," and "mean Greenwich noon," but "0^h universal time" and "12^h universal time," thus clearly indicating which reckoning of time is employed. The words *midnight* and *noon* have a purely local character like the words *evening* and *morning*; at a given instant it can be 0^h on the whole earth, if we have agreed to designate this given instant everywhere with this number, but there can be midnight only under one meridian at the same absolute instant; so the words *midnight* and *noon* are to be avoided when speaking of universal time. On page i of the month we might perhaps say, instead of "apparent noon," "at upper transit at Greenwich," as this is employed in other parts of the *Nautical Almanac*. When these indications are made, a single glance at the head of the column will inform everyone, who in future times makes use of the *Nautical Almanac*, whether the book he works with is still based on "Greenwich mean time," or already on "universal time," so that an error is nearly impossible. Indeed, I never heard of an error being caused, for instance, by the circumstance that the tables of *Jupiter*, *Saturn*, and *Uranus*, by Bouvard, or the tables of *Jupiter's* Satellites, by Damoiseau, which are used in the computations for the *Nautical Almanac*, take midnight as the initial epoch. As to the ephemerides of the planets, they ought surely, as Professor Newcomb suggests, for the sake of interpolation to be given for "0^h universal time," but I do not see any disadvantage or serious trouble which could arise from this break of half a day in the

series of ephemerides, nor do I think it a very important thing that the precepts concerning time in our books on practical astronomy should be changed. Changes occur in other branches of science which necessitate more important alterations in the respective books, and they are made in new editions without the least confusion arising. I think that generally we are more inclined to *over* than to *under* estimate the trouble of a transition period; and I think the uniformity of astronomical and civil reckoning is surely worth the little trouble we shall have to overcome, at the beginning of the change, until the new reckoning is firmly rooted in all minds.

On the Right Ascensions of the Cape Catalogues for 1850 *and* 1880.

By A. M. W. Downing, M.A.

In the Introduction to the Cape Catalogue for 1850 Mr. Gill gives a comparison between the R.A.'s of that Catalogue and of the Cape Catalogue for 1880. From this it appears that there is a considerable discordance between the R.A.'s of these Catalogues depending on N.P.D. From certain other comparisons which he makes Mr. Gill concludes that the results of the Dollond Transit Instrument (contained in the 1850 Catalogue) may be accepted with considerable confidence, and appears to consider that the discordance in question is probably due to variation in the plane of collimation in the Cape Transit Circle at different altitudes, and that therefore the discordances between the R.A.'s of the 1850 and 1880 Catalogues arise from errors in the latter. Without wishing to enter into any controversy on the subject, I desire to lay before the Society some evidence, taken from comparisons of southern catalogues which I happened to have by me, which appears to throw some light on this matter. And first for the Cape Catalogues for 1850 and 1880. I have made use of the materials on pp. viii and ix of the Introduction to the 1850 Catalogue, taking the mean differences of R.A. for every 6° of N.P.D. I thus obtain the following mean differences:—

Mean N.P.D.	Mean $\Delta\alpha$ 1880−1850.	Number of Stars.	Mean N.P.D.	Mean $\Delta\alpha$ 1880−1850.	Number of Stars.
° ′	s		° ′	s	
92 55	−0·007	144	141 0	−0·164	313
98 51	− ·026	139	147 1	− ·080	296
104 58	− ·027	112	151 42	− ·062	245
112 5	− ·056	147	158 43	− ·064	188
116 51	− ·079	502	164 46	− ·027	77
122 37	− ·100	393	170 14	+ ·084	58
129 4	− ·131	358	176 38	−0·347	15
134 55	−0·149	381			

The weighted mean difference (without reduction to the equator) is $-0^s\cdot090$, and the total number of stars used is 3368.

By a graphical representation of these mean differences, and drawing a curve through them, the following were obtained by reading off from the curve for every 5° of N.P.D.

N.P.D.	$\Delta\alpha$	N.P.D.	$\Delta\alpha$
°	s	°	s
95	−0·013	135	−0·149
100	− ·021	140	− ·161
105	− ·032	145	− ·103
110	− ·048	150	− ·078
115	− ·070	155	− ·060
120	− ·091	160	− ·042
125	− ·113	165	−0·025
130	−0·134		

Thus a notable discordance depending on N.P.D. is made manifest, ranging from $-0^s\cdot013$ at 95° to $-0^s\cdot161$ at 140°.

I take next the Cape Catalogues for 1840 and 1850. By bringing up the places of the stars which are common to these two Catalogues from 1840 to 1850, using the proper motions given in the former Catalogue, or, wherever possible, those of the Cape Catalogue for 1880, and then taking the differences, and combining these differences in groups of (generally) 5° of N.P.D., we obtain the following mean differences:—

Mean N.P.D.	Mean $\Delta\alpha$ 1840−1850.	Number of Stars.	Mean N.P.D.	Mean $\Delta\alpha$ 1840−1850.	Number of Stars.
° ′	s		° ′	s	
42 4	+0·047	3	117 5	−0·011	87
56 15	+ ·030	3	122 7	− ·016	85
62 4	− ·008	6	127 24	− ·045	111
67 45	− ·009	12	132 37	− ·049	127
72 19	+ ·064	7	137 54	− ·070	83
77 32	+ ·009	12	141 55	− ·062	77
82 25	+ ·031	19	147 43	− ·075	83
86 21	+ ·038	11	152 26	− ·050	58
91 48	− ·005	11	157 39	− ·110	67
97 59	+ ·044	15	162 20	− ·072	39
102 34	+ ·024	17	167 24	− ·164	28
107 14	+ ·022	43	174 0	+0·028	18
112 34	−0·013	68			

The weighted mean is $-0^s\cdot041$ ($-0^s\cdot025$ from 80° to 140°), and the total number of stars is 1090. By proceeding exactly as in the preceding case, the reduction curve gives:—

N.P.D.	$\Delta\alpha$	N.P.D.	$\Delta\alpha$
°	s	°	s
75	+0·027	120	−0·020
80	+ ·027	125	− ·032
85	+ ·027	130	− ·047
90	+ ·021	135	− ·061
95	+ ·023	140	− ·067
100	+ ·029	145	− ·067
105	+ ·021	150	− ·068
110	+ ·004	155	− ·078
115	−0·011	160	−0·093

In this case also we have a considerable discordance depending on N.P.D.

The next two Catalogues compared are the Cape Catalogue for 1880 and the Melbourne Catalogue for 1870. Proceeding exactly as in the preceding case, we have the following mean differences in R.A.:—

Mean N.P.D.	Mean $\Delta\alpha$ 1880−1870	Number of Stars.	Mean N.P.D.	Mean $\Delta\alpha$ 1880−1870	Number of Stars.
° ′	s		° ′	s	
44 38	+0·015	2	117 28	−0·040	37
51 11	·000	2	122 13	− ·030	36
57 41	− ·020	4	127 28	− ·021	68
62 9	+ ·013	10	132 7	+ ·007	71
67 57	·000	9	137 23	− ·048	60
72 6	− ·003	8	141 50	− ·040	33
77 3	+ ·033	12	147 55	+ ·017	45
82 36	+ ·011	16	152 31	− ·001	209
87 17	·000	9	157 46	− ·058	130
91 45	+ ·001	14	161 55	− ·077	20
97 59	− ·006	7	168 8	− ·116	29
102 54	− ·018	6	172 39	+ ·002	42
107 27	− ·031	11	177 1	−0·074	15
113 15	−0·041	10			

The combined mean difference is $-0^s\cdot021$, and the total number of stars used in the comparison is 915.

By reading off from the reduction curve for every 5°, we have:—

N.P.D.	Δα	N.P.D.	Δα
°	s	°	s
50	0·000	115	−0·038
55	− ·007	120	− ·036
60	− ·002	125	− ·025
65	+ ·003	130	− ·014
70	+ ·004	135	− ·026
75	+ ·013	140	− ·033
80	+ ·017	145	− ·013
85	+ ·009	150	− ·005
90	·000	155	− ·024
95	− ·005	160	− ·069
100	− ·014	165	− ·083
105	− ·025	170	− ·067
110	−0·037	175	−0·063

The comparison of the R.A.'s of these Catalogues is very satisfactory, as, except in the immediate neighbourhood of the Pole, the discordances are small, and the range confined within reasonable limits.

In order to compare the R.A.'s of the Cape Catalogue for 1880 and 1860, I have made use of the comparison between the R.A.'s of Melbourne (1870) and Cape (1860), arranged in order of N.P.D., given by De Ball in his paper, "Untersuchungen über die eigene Bewegung des Sonnensystems,' p. 3, and applying this to the values of Δα (1880–1870) given above, we have :—

N.P.D.	Δα (1880 − 1860)	N.P.D.	Δα (1880 − 1860)
°	s	°	s
60	−0·002	115	−0·018
65	− ·007	120	− ·016
70	− ·006	125	+ ·005
75	+ ·003	130	+ ·036
80	+ ·007	135	+ ·034
85	− ·001	140	+ ·057
90	·000	145	+ ·087
95	+ ·005	150	+ ·105
100	− ·004	155	+ ·076
105	− ·015	160	+ ·031
110	−0·027	165	+0·017

Here again we have a considerable range in the discordances in R.A. depending on N.P.D.

By means of these various comparisons we have the materials for comparing the R.A.'s of each of the two Catalogues under consideration—viz. those for 1850 and 1880—with the mean of three other Catalogues. Thus we have comparisons of the R.A.'s of the 1880 Catalogue with those of Melbourne (1870) and Cape (1860); and also with those of Cape (1840) indirectly, by

means of the Cape Catalogue for 1850. Similarly we have the R.A.'s of the 1850 Catalogue compared directly with those of Cape (1840) and indirectly (through the comparison with the 1880 Catalogue), with those of Melbourne (1870) and Cape (1860). We thus find the following comparison of the R.A.'s of the Cape Catalogues for 1850 and 1880 with the mean of the three other Catalogues, arranged in order of N.P.D. :—

N.P.D.	$\Delta\alpha$ (1880−Mean).	$\Delta\alpha$ (1850−Mean).	N.P.D.	$\Delta\alpha$ (1880−Mean).	$\Delta\alpha$ (1850−Mean)
°	s	s	°	s	s
60	−0·002		115	−0·038	+0·032
65	− ·002		120	− ·041	+ ·049
70	− ·001		125	− ·034	+ ·079
75	+ ·008		130	− ·022	+ ·112
80	+ ·012		135	− ·027	+ ·122
85	+ ·004		140	− ·023	+ ·138
90	·000		145	+ ·013	+ ·116
95	− ·012	+0·001	150	+ ·030	+ ·108
100	− ·023	− ·002	155	+ ·023	+ ·083
105	− ·031	+ ·001	160	+0·005	+0·046
110	−0·039	+0·009			

As tried by this test the R.A.'s of the Catalogue for 1880 appear to be much superior to those of the Catalogue for 1850. It may, however, be objected that this comparison is unduly favourable to the 1880 Catalogue, as, if systematic discordances, arising from uncorrected proper motions, affect the comparison of the Catalogues for 1850 and for 1880 to any appreciable extent, they would affect the comparison of the 1850 Catalogue with the mean considerably more than that of the 1880 Catalogue. Although I do not think that, considering the large number of stars used in the comparison (more than 3000), there can be any considerable outstanding systematic discordance arising from the use of erroneous proper motions; still, in deference to the opinion which has been expressed on the subject, I have made a comparison of the R.A.'s of the two Catalogues with the mean of the Cape Catalogues for 1840 and 1860, thus meeting the objection referred to above. The result is as follows :—

N.P.D.	$\Delta\alpha$ (1880−Mean).	$\Delta\alpha$ (1850−Mean).	N.P.D.	$\Delta\alpha$ (1880−Mean).	$\Delta\alpha$ (1850−Mean).
°	s	s	°	s	s
95	−0·016	−0·003	130	−0·026	+0·109
100	− ·027	− ·006	135	− ·027	+ ·122
105	− ·034	− ·002	140	− ·019	+ ·143
110	− ·040	+ ·009	145	+ ·026	+ ·129
115	− ·039	+ ·032	150	+ ·048	+ ·126
120	− ·044	+ ·046	155	+ ·047	+ ·107
125	−0·038	+0·075	160	+0·042	+0·083

Although the range of discordances in R.A. depending on N.P.D. is somewhat increased for the 1880 Catalogue by this proceeding, it still shows its superiority to the 1850 Catalogue. The extreme range for the former being from $-0^s{\cdot}044$ at N.P.D. 120° to $+0^s{\cdot}048$ at N.P.D. 150°, and for the latter from $-0^s{\cdot}006$ at N.P.D. 100° to $+0^s{\cdot}143$ at N.P.D. 140°. It appears, therefore, that, as far as this evidence goes, errors in the R.A.'s of the Cape Catalogue for 1850 are the principal cause of the discordances in R.A. depending on N.P.D. which appear in the comparison of the R.A.'s of the Cape Catalogues for 1850 and 1880.

Attention may also be called to the discordances between the R.A.'s of the 1840 and 1850 Catalogues when the same instrument was used; and also to the discordances between the R.A.'s of the 1860 and 1880 Catalogues, where again the same instrument was used. It would appear, therefore, that the discordances between the 1850 and 1880 Catalogues are not necessarily due to any cause arising from the use of a different instrument in making the observations.

It may be remarked that the discordances in R.A. given in this paper throughout are the actual discordances at the respective N.P.D.'s, without reduction to the equator.

On the Star Places of the Nautical Almanac.

By A. M. W. Downing, M.A.

In the *Nautical Almanac* for 1884 a change is introduced in the sources from whence the places of the Greenwich fundamental stars are taken. The mean Right Ascensions of 182* stars have been derived (as we are informed in the Preface to the *Nautical Almanac* for 1884) from (1) the table, pp. 21–22, of the Greenwich Nine-Year Catalogue; (2) the Greenwich Clock-star List for 1879; (3) the Nine-Year Catalogue itself. The mean Declinations have been brought up from the Nine-Year Catalogue, including the corrections of table, p. 27. It appears, therefore, that the Right Ascensions of those stars which are used as clock stars at Greenwich are derived from the standard Right Ascensions of clock stars from 12-hour groups observed during the years 1868–1876, and the Right Ascensions of the remaining *Nautical Almanac* stars are taken from the Nine-Year Catalogue itself. Also that the Declinations of the *Nautical Almanac* are those of the Nine-Year Catalogue corrected so as to depend on the refractions of Bessel's *Tabulæ Regiomontanæ*, with the corresponding value of the latitude of Greenwich. In the *Nautical Almanac* for 1883 the mean places of the Greenwich standard

* Mr. Hind informs me that from 1880 onwards, the place of *α Columbæ* has been derived from the Cape and Melbourne Catalogues. This reduces the total number of stars whose places are taken from the Greenwich Catalogues to 182.

stars are derived from the Greenwich Catalogues for 1860 and 1864. In this paper I propose to discuss the systematic differences between the places of the *Nautical Almanac* stars as given in the *Nautical Almanacs* for 1883 and 1884, consequent on the change from the Seven-Year Catalogues to the Nine-Year Catalogue, confining myself to the case of those stars whose places are derived from the Greenwich Observations. The places of the stars as given in the *Nautical Almanac* for 1883 have been brought up to 1884 by applying the annual variations, and the differences taken. The stars have then been arranged in order of Declination, and the following table exhibits, in this order, the differences *Nautical Almanac* 1883—*Nautical Almanac* 1884 for the individual stars.

Name of Star.	Approx. Dec.	$\Delta\alpha$	$\Delta\delta$
	° ′	s	″
λ Ursæ Min.	+88 57	+2·040	+0·14
α Ursæ Min.	88 41	−0·088	−0·06
Cephei 51 (Hev.)	87 13	+0·775	−0·48
δ Ursæ Min.	86 36	+0·696	−0·46
ε Ursæ Min.	82 14	+0·008	+0·34
ζ Ursæ Min.	78 9	+0·365	−1·23
γ Cephei	76 59	+0·010	−0·68
β Ursæ Min.	74 38	+0·050	−0·74
β^2 Cephei	70 3	+0·074	−0·65
λ Draconis	69 58	+0·134	+0·15
α Draconis	64 56	+0·067	−0·14
α Ursæ Maj.	62 23	+0·140	−0·05
α Cephei	62 6	+0·050	−0·79
η Draconis	61 47	+0·238	−1·02
α Cassiopeiæ	55 54	+0·053	−0·08
γ Ursæ Maj.	54 20	+0·104	−0·63
β Draconis	52 23	+0·068	−0·81
θ Ursæ Maj.	52 12	−0·017	−0·37
γ Draconis	51 30	+0·035	−0·41
η Ursæ Maj.	49 53	+0·090	−0·51
α Persei	49 27	+0·027	−0·44
ι Ursæ Maj.	48 30	+0·084	−0·49
α Aurigæ	45 53	+0·066	+0·12
α Cygni	44 52	+0·002	−0·25
α Canum Venat.	38 57	−0·054	+0·47
α Lyræ	38 41	+0·030	−0·27
61[1] Cygni	38 11	−0·167	−0·35
β Andromedæ	+35 0	−0·003	+0·36

Name of Star.	Approx. Dec.	Δα	Δδ
	° ′	s	″
β^1 Lyræ	+33 14	+0·002	−0·25
ι Aurigæ	32 59	+0·018	−0·43
α^2 Geminorum	32 8	+0·068	+0·14
ζ Herculis	31 49	+0·024	+0·48
ρ Boötis	30 53	+0·040	+0·54
ζ Cygni	29 45	−0·014	−0·05
β Tauri	28 30	+0·057	−0·60
α Andromedæ	28 27	+0·003	−0·04
β Geminorum	28 18	+0·030	+0·15
6 Cancri	28 7	−0·013	−0·53
μ Herculis	27 47	+0·012	−0·36
32 Vulpeculæ	27 37	−0·003	−0·11
ϵ^2 Boötis	27 34	+0·014	+0·07
ψ Boötis	27 24	+0·041	−0·11
α Coronæ	27 6	+0·046	+0·24
μ Leonis	26 33	−0·003	+0·27
16 Pegasi	25 23	+0·021	−0·10
ϵ Leonis	24 18	+0·051	−0·15
η Tauri	23 45	−0·018	−0·25
α Arietis	22 55	+0·002	+0·10
μ Geminorum	22 34	+0·028	−0·75
η Geminorum	22 32	+0·001	−0·07
δ Geminorum	22 11	+0·055	−0·34
γ Cancri	21 53	−0·007	−0·72
A Tauri	21 46	+0·014	−0·47
δ Leonis	21 10	+0·043	+0·07
η Cancri	20 50	−0·011	−0·44
γ^1 Leonis	20 26	+0·012	+0·42
β Arietis	20 14	−0·069	+0·14
α Boötis	19 47	+0·037	+1·00
f Boötis	19 44	+0·029	−0·15
γ Herculis	19 26	−0·005	+0·20
δ Arietis	19 17	+0·002	+0·03
η Boötis	18 59	+0·025	+0·65
ϵ Tauri	18 55	−0·017	+0·05
83 Cancri	18 12	−0·013	−0·21
τ Boötis	18 2	+0·005	−0·02
γ Geminorum	16 30	+0·016	−0·16
α Tauri	+16 16	+0·016	−0·04

Name of Star.	Approx. Dec.	$\Delta\alpha$	$\Delta\delta$
	° ′	s	″
γ Tauri	+15 21	+0·014	−0·40
β Leonis	15 13	−0·003	+0·17
ϵ Aquilæ	14 55	−0·037	−0·05
ν Orionis	14 47	+0·003	−0·61
η Piscium	14 45	−0·023	+0·46
σ Arietis	14 36	−0·040	+0·44
α Pegasi	14 35	−0·026	+0·27
γ Pegasi	14 32	+0·004	−0·54
α^1 Herculis	14 31	+0·018	−0·24
ζ Aquilæ	13 42	−0·072	+0·48
ξ Geminorum	13 1	−0·023	−0·65
α Ophiuchi	12 39	−0·014	+0·44
α Leonis	12 32	+0·021	+0·10
α Cancri	12 18	−0·004	+0·23
ϵ Virginis	11 35	−0·002	+0·03
ω Aquilæ	11 23	−0·044	−0·27
l Leonis	11 9	−0·023	−0·12
κ Cancri	11 8	+0·026	−0·30
ϵ Delphini	10 55	−0·040	+0·86
o Leonis	10 25	−0·019	+0·23
γ Aquilæ	10 20	+0·027	+0·02
ζ Pegasi	10 14	−0·069	−0·23
ρ Leonis	9 54	+0·029	−0·80
κ Ophiuchi	9 33	−0·042	+0·53
β Cancri	9 33	−0·004	+1·01
72 Ophiuchi	9 33	−0·022	+0·20
ϵ Pegasi	9 21	+0·024	−0·25
o Tauri	8 37	+0·019	+0·08
π Leonis	8 36	−0·004	−0·58
o Piscium	8 34	−0·018	−0·19
α Aquilæ	8 34	+0·009	−0·05
β Canis Min.	8 31	+0·007	+0·21
χ Leonis	7 58	−0·015	−0·77
ξ^2 Ceti	7 56	−0·025	−0·50
α Orionis	7 23	+0·026	−0·78
ϵ Piscium	7 16	+0·052	−0·46
π Virginis	7 16	+0·003	−0·97
δ Piscium	6 57	−0·058	−0·12
ϵ Hydræ	+6 51	+0·030	−0·30

Name of Star.	Approx. Dec.	$\Delta\alpha$	$\Delta\delta$
		s	″
α Serpentis	+6° 47′	+0·015	+0·03
ω Piscium	6 13	−0·020	−0·36
β Aquilæ	6 7	−0·018	+0·47
α Canis Min.	5 31	+0·103	−1·05
ι Piscium	5 0	−0·033	−0·35
ν Piscium	4 54	−0·038	−0·62
ϵ Serpentis	4 50	−0·012	−0·64
β Ophiuchi	4 37	−0·014	−0·21
σ Ophiuchi	4 15	−0·010	+0·13
d Leonis	4 14	−0·039	−0·36
δ Virginis	4 2	+0·007	−0·82
α Ceti	3 38	+0·002	−0·14
τ Leonis	3 30	−0·041	+0·42
δ Aquilæ	2 53	−0·042	+0·21
γ^2 Ceti	2 45	+0·020	−0·43
γ Piscium	2 39	−0·034	−0·90
τ Virginis	2 6	+0·003	−0·65
κ Piscium	+0 37	−0·019	−0·93
ζ Virginis	0 0	+0·011	+0·09
η Virginis	−0 1	−0·034	−0·50
υ Leonis	0 11	−0·029	−0·32
δ Orionis	0 23	+0·032	−0·52
η Aquarii	0 43	−0·057	−0·97
γ^1 Virginis	0 49	+0·071	−1·58
α Aquarii	0 53	−0·061	−0·79
θ Aquarii	1 10	−0·020	−0·28
ϵ Orionis	1 16	−0·016	−0·53
γ Aquarii	1 58	−0·028	−0·17
η Serpentis	2 56	−0·022	+0·35
δ Ophiuchi	3 24	−0·030	0·00
μ Eridani	3 28	0·000	+0·12
12 Ceti	4 36	−0·029	−0·54
θ Virginis	4 55	−0·026	−0·48
β Aquarii	6 5	−0·049	+0·08
67 Ceti	6 57	−0·028	−0·76
o^1 Eridani	7 8	−0·053	−0·96
α Hydræ	8 9	−0·019	−0·57
λ Aquarii	8 12	−0·039	+0·26
β Orionis	−8 20	−0·014	−0·92

Name of Star.	Approx. Dec.	$\Delta\alpha$	$\Delta\delta$
	° ′	s	″
θ Aquarii	− 8 22	−0·026	−0·94
θ Ceti	8 47	−0·051	+0·18
β Libræ	8 57	−0·027	−0·38
ι Ceti	9 28	−0·052	−1·21
κ Orionis	9 43	−0·026	−0·37
ϵ Eridani	9 51	+0·009	−1·07
ϵ Aquarii	9 55	−0·038	−0·30
ζ Ophiuchi	10 19	−0·007	−0·98
α Virginis	10 33	−0·024	−0·21
θ Canis Maj	11 54	+0·005	+0·41
α^2 Capricorni	12 54	−0·055	−0·16
γ^1 Eridani	13 50	−0·044	−0·12
δ Crateris	14 9	−0·007	−0·31
γ Canis Maj.	15 28	−0·004	+1·17
α Libræ	15 34	−0·013	−0·53
η Ophiuchi	15 35	−0·019	−0·12
δ^2 Corvi	15 52	+0·042	−0·52
μ Hydræ	16 15	−0·030	−1·12
α Canis Maj.	16 33	+0·094	+1·34
θ Capricorni	17 42	−0·006	+0·18
α Leporis	17 54	+0·050	+1·31
ρ Capricorni	18 12	−0·076	−0·09
β Ceti	18 37	−0·055	−1·09
β^1 Scorpii	19 29	−0·020	−0·94
μ Sagittarii	21 5	−0·070	−0·11
ϵ Corvi	21 58	+0·026	−1·11
ϵ Leporis	22 32	−0·057	−1·11
β Corvi	22 45	−0·094	−0·84
15 Argûs	23 58	+0·017	−0·78
ξ Argûs	24 34	+0·016	−2·39
θ Ophiuchi	24 53	−0·013	+0·34
h^2 Sagittarii	25 8	−0·098	−0·40
λ Sagittarii	25 29	−0·005	−2·49
α Scorpii	26 10	+0·005	−0·01
δ Sculptoris	28 46	−0·028	−0·13
ϵ Canis Maj.	28 49	+0·016	−0·32
α Piscis Aust.	−30 14	−0·054	−0·81

The stars have been combined in convenient groups, omitting, for the R.A.'s, those within 13° of the Pole, and for both co-

ordinates *Procyon*, *Sirius*, γ *Virginis*, and 61 *Cygni*. The mean $\Delta\alpha$'s and $\Delta\delta$'s have then been graphically represented, and curves drawn through them, from which can be read off the differences corresponding to any declination between the extreme limits. The table gives the mean differences and the corresponding quantities as read off from the curves.

Mean Dec.	Mean $\Delta\alpha$	Mean $\Delta\delta$	Number of Stars.	From Curves. $\Delta\alpha$	From Curves. $\Delta\delta$
° ′	s	″		s	″
+87 52		−0·22	4		
80 12		− ·45	2		−0·41
72 55	+0·067	− ·48	4		− ·48
62 48	+ ·124	− ·50	4	+0·074	− ·49
53 16	+ ·049	− ·46	5	+ ·059	− ·44
47 43	+ ·054	− ·31	5	+ ·043	− ·24
34 13	+ ·016	+ ·13	8	+ ·026	− ·04
27 43	+ ·016	− ·10	12	+ ·015	− ·05
22 3	+ ·009	− ·21	12	+ ·012	− ·07
18 31	+ ·010	+ ·14	10	+ ·004	+ ·02
13 22	− ·014	+ ·02	19	− ·005	·00
8 26	− ·002	− ·18	21	− ·009	− ·16
+ 4 7	− ·018	− ·28	15	− ·015	− ·28
− 1 37	− ·022	− ·36	15	− ·023	− ·37
9 9	− ·029	− ·46	17	− ·027	− ·41
18 33	− ·024	− ·33	16	−0·024	−0·48
−26 27	−0·016	−0·78	9		

The next table gives the differences $\Delta\alpha$ and $\Delta\delta$, read off from the curves for every 5° from Declination +85° to −25° for $\Delta\delta$, and from +70° to −25° for $\Delta\alpha$.

Dec.	$\Delta\alpha$	$\Delta\delta$	Dec.	$\Delta\alpha$	$\Delta\delta$
	s		°	s	″
			+30	+0·017	−0·03
+85		−0·29	25	+ ·013	− ·07
80		− ·41	20	+ ·009	·00
75		− ·46	15	− ·003	+ ·01
70	+0·070	− ·48	10	− ·008	− ·09
65	+ ·074	− ·49	+ 5	− ·013	− ·22
60	+ ·072	− ·48	0	− ·022	− ·37
55	+ ·063	− ·45	− 5	− ·027	− ·40
50	+ ·050	− ·33	10	− ·028	− ·41
45	+ ·040	− ·20	15	− ·027	− ·44
40	+ ·032	− ·12	20	− ·023	− ·50
+35	+0·026	−0·05	−25	−0·018	−0·62

These corrections with reversed signs have been applied to the $\Delta\alpha$ and $\Delta\delta$ for every star, excepting the four mentioned above, situated between Dec. $+50°$ and $-25°$; and it is considered that the outstanding differences are those depending on R.A. The stars have therefore been arranged in order of R.A. and combined in groups of 1^h each, and by a graphical representation of the mean differences, similar to that explained above, we obtain from the two curves which have been drawn the values of $\Delta\alpha$ and $\Delta\delta$, corresponding to the mean R.A. of each group here given:—

Mean R.A.	Mean $\Delta\alpha$	Mean $\Delta\delta$	Number of Stars.	From Curves. $\Delta\alpha$	From Curves. $\Delta\delta$
h m	s	″		s	″
0 26	−0·007	−0·33	7	−0·014	−0·21
1 28	− ·030	+ ·19	6	− ·018	+ ·01
2 29	− ·001	− ·01	6	− ·009	+ ·01
3 31	− ·001	− ·12	7	·000	− ·11
4 27	+ ·002	− ·15	6	+ ·007	− ·12
5 24	+ ·024	− ·04	9	+ ·015	− ·05
6 29	+ ·009	+ ·05	7	+ ·017	− ·06
7 33	+ ·022	− ·30	6	+ ·017	− ·15
8 31	+ ·012	− ·04	7	+ ·013	− ·12
9 30	+ ·006	− ·08	7	+ ·007	− ·09
10 31	+ ·003	− ·13	7	+ ·005	− ·08
11 29	+ ·006	+ ·06	6	+ ·003	− ·04
12 32	− ·004	− ·14	7	+ ·004	− ·03
13 35	+ ·017	+ ·10	7	+ ·013	+ ·08
14 34	+ ·019	+ ·24	6	+ ·017	+ ·14
15 37	+ ·013	− ·05	5	+ ·011	+ ·10
16 29	− ·004	+ ·23	5	+ ·003	+ ·17
17 23	+ ·006	+ ·26	7	− ·002	+ ·16
18 25	− ·015	− ·12	7	− ·012	+ ·07
19 27	− ·023	+ ·26	7	− ·020	+ ·18
20 32	− ·019	+ ·29	8	− ·019	+ ·21
21 36	− ·012	− ·02	5	− ·017	+ ·06
22 33	− ·023	− ·02	6	− ·017	− ·11
23 30	−0·009	−0·36	4	−0·012	−0·27

By reading off from the curves for the beginning of each hour we have the following systematic discordances in R.A. and Dec. depending on Right Ascension:—

R.A. h m	$\Delta\alpha_\alpha$ s	$\Delta\delta_\alpha$ "	R.A. h m	$\Delta\alpha_\alpha$ s	$\Delta\delta$ "
0 0	−0·013	−0·24	12 0	+0·004	−0·03
1 0	− ·017	− ·10	13 0	+ ·008	− ·01
2 0	− ·013	+ ·01	14 0	+ ·016	+ ·11
3 0	− ·004	− ·04	15 0	+ ·015	+ ·14
4 0	+ ·004	− ·12	16 0	+ ·008	+ ·12
5 0	+ ·012	− ·08	17 0	− ·001	+ ·17
6 0	+ ·017	− ·05	18 0	− ·007	+ ·09
7 0	+ ·017	− ·11	19 0	− ·017	+ ·13
8 0	+ ·015	− ·13	20 0	− ·019	+ ·20
9 0	+ ·009	− ·09	21 0	− ·018	+ ·17
10 0	+ ·006	− ·08	22 0	− ·017	− ·01
11 0	+0·004	−0·07	23 0	−0·014	−0·18

The differences in the last table have then been applied, with reversed signs, to the $\Delta\alpha$ and $\Delta\delta$ of each star, arranged in order of Declination, which has been used in forming the first approximation to the systematic discordances depending on Declination. The residuals may be considered to be free from discordances depending on R.A., and being treated exactly as before, give the second approximation to the values of the systematic discordances depending on Declination. This table gives the resulting mean differences and the corresponding quantities read off from the curves.

Mean Dec. ° ′	Mean $\Delta\alpha$ s	Mean $\Delta\delta$ "	Number of Stars.	From Curves. $\Delta\alpha$ s	From Curves. $\Delta\delta$
+87 52		−0·18	4		
80 12		− ·57	2		−0·45
72 55	+0·070	− ·47	4		− ·52
62 48	+ ·122	− ·57	4	+ ·073	− ·51
53 16	+ ·053	− ·43	5	+ ·061	− ·44
47 43	+ ·051	− ·31	5	+ ·043	− ·24
34 13	+ ·016	+ ·11	8	+ ·025	− ·06
27 43	+ ·015	− ·12	12	+ ·013	− ·07
22 3	+ ·004	− ·14	12	+ ·006	− ·07
18 31	·000	+ ·13	10	− ·002	+ ·04
13 22	− ·011	+ ·04	19	− ·006	+ ·02
8 26	·000	− ·15	21	− ·007	− ·14
+ 4 7	− ·013	− ·27	15	− ·012	− ·26
− 1 37	− ·018	− ·32	15	− ·020	− ·35
9 9	− ·027	− ·45	17	− ·025	− ·39
18 33	− ·026	− ·33	16	−0·024	−0·47
−26 27	−0·015	−0·75	9		

The following table gives the adopted systematic discordances in R.A. and Declination depending on Declination. As this second approximation differs so little from the first, it was not considered necessary to proceed to a further approximation.

Dec.	$\Delta\alpha_\delta$	$\Delta\delta_\delta$	Dec.	$\Delta\alpha_\delta$	$\Delta\delta_\delta$
°	s	"	°	s	"
+85		−0·28	+30	+0·017	−0·06
80		− ·46	25	+ ·010	− ·07
75		− ·52	20	+ ·001	− ·05
70	+0·072	− ·53	15	− ·006	+ ·03
65	+ ·073	− ·53	10	− ·007	− ·09
60	+ ·071	− ·50	+ 5	− ·010	− ·22
55	+ ·063	− ·47	0	− ·018	− ·33
50	+ ·050	− ·32	− 5	− ·023	− ·38
45	+ ·038	− ·20	10	− ·026	− ·40
40	+ ·031	− ·11	15	− ·026	− ·42
+35	+0·026	−0·07	20	− ·024	− ·50
			−25	−0·018	−0·62

The total systematic discordance for any star is therefore found from the last table and the last but two by a proper combination of the quantities $\Delta\alpha_\alpha$ and $\Delta\alpha_\delta$ for R.A., and $\Delta\delta_\alpha$ and $\Delta\delta_\delta$ for Declination; the sum of the discordance depending on R.A. and of the discordance depending on Declination forming, of course, the total discordance. It must, however, be borne in mind that there are but few stars in the several groups from which these systematic discordances are derived, and that therefore they must not be considered as entitled to entire confidence.

On pp. 90, 91 of Dr. Auwers' paper, which forms a Supplement to the *Berliner Jahrbuch* for 1884, he gives the corrections to reduce the systems of the *Nautical Almanac* (1883), the *American Ephemeris*, and the *Connaissance des Temps* to that of the *Berliner Jahrbuch*. By making use of these tables we have the following systematic corrections to the *Berliner Jahrbuch*, the *American Ephemeris*, and the *Connaissance des Temps* respectively, to reduce them to the system of the *Nautical Almanac* for 1884.

Corrections depending on Declination.

Dec.	*Berliner Jahrbuch.*		*American Ephemeris.*		*Conn. des Temps.*	
°	s	"	s	"	s	"
+75		−0·73		−0·69		−0·80
70	−0·049	− ·61	+0·015	− ·58	−0·133	− ·59
65	− ·062	− ·47	− ·028	− ·44	− ·121	− ·36
60	− ·071	− ·36	− ·059	− ·32	− ·101	− ·12

Dec.	*Berliner Jahrbuch.*		*American Ephemeris.*		*Conn. des Temps.*	
°	s	"	s	"	s	"
55	− ·075	− ·22	− ·074	− ·16	− ·076	+ ·07
50	− ·073	− ·20	− ·081	− ·09	− ·068	− ·04
45	− ·068	− ·10	− ·083	+ ·05	+ ·010	− ·30
40	− ·068	− ·02	− ·088	+ ·13	+ ·026	− ·27
35	− ·062	+ ·04	− ·083	+ ·18	+ ·019	− ·06
30	− ·042	+ ·02	− ·058	+ ·11	+ ·012	− ·10
25	− ·021	− ·07	− ·032	− ·06	+ ·022	− ·26
20	− ·015	+ ·13	− ·027	+ ·07	+ ·029	− ·22
15	− ·015	+ ·04	− ·031	− ·06	+ ·032	− ·46
10	− ·017	− ·17	− ·037	− ·22	+ ·012	− ·62
+ 5	− ·013	− ·10	− ·036	− ·20	+ ·001	− ·36
0	− ·012	+ ·08	− ·032	− ·12	+ ·001	− ·12
− 5	− ·017	+ ·27	− ·033	+ ·02	·000	+ ·06
10	− ·018	+ ·44	− ·035	+ ·14	+ ·002	+ ·08
15	− ·020	+ ·62	− ·039	+ ·25	+ ·003	+ ·02
20	− ·021	+ 0·86	− ·040	+ ·34	− ·001	+ ·09
−25	−0·020	+1·11	−0·037	+0·50	−0·011	+0·36

Corrections depending on Right Ascension.

R.A.		*Berliner Jahrbuch.*		*American Ephemeris.*		*Conn. des Temps.*	
h	m	s	"	s	"	s	"
0	0	−0·025	+0·25	−0·023	+0·20	+0·011	+0·11
1	0	− ·012	+ ·05	− ·011	+ ·08	+ ·017	+ ·01
2	0	− ·004	− ·12	− ·003	− ·10	+ ·013	− ·07
3	0	− ·002	− ·10	·000	− ·16	− ·005	− ·01
4	0	+ ·005	− ·08	+ ·009	− ·23	− ·027	+ ·07
5	0	+ ·008	− ·17	+ ·012	− ·31	− ·043	+ ·05
6	0	+ ·012	− ·25	+ ·012	− ·27	− ·042	+ ·06
7	0	+ ·012	− ·23	+ ·009	− ·19	− ·030	+ ·14
8	0	− ·002	− ·26	− ·004	− ·27	− ·022	+ ·13
9	0	− ·025	− ·31	− ·024	− ·31	− ·034	+ ·07
10	0	− ·023	− ·28	− ·019	− ·23	− ·033	+ ·09
11	0	− ·003	− ·19	+ ·001	− ·07	− ·020	+ ·15
12	0	+ ·016	− ·11	+ ·015	+ ·08	− ·010	+ ·17
13	0	+ ·022	+ ·02	+ ·018	+ ·24	− ·005	+ ·18
14	0	+ ·016	+ ·09	+ ·009	+ ·25	− ·007	+ ·10
15	0	+ ·010	+ ·21	+ ·002	+ ·20	− ·005	+ ·01
16	0	+ ·006	+ ·41	·000	+ ·32	+ ·003	− ·22
17	0	+ ·001	+ ·43	·000	+ ·35	+ ·009	− ·17

R.A.		*Berliner Jahrbuch.*		*American Ephemeris.*		*Conn. des Temps.*	
h	m	s	"	s	"	s	"
18	0	− ·010	+ ·51	− ·006	+ ·50	+ ·010	+ ·02
19	0	− ·019	+ ·34	− ·016	+ ·34	+ ·010	− ·04
20	0	− ·029	+ ·13	− ·029	+ ·07	+ ·006	− ·20
21	0	− ·035	+ ·06	− ·037	− ·04	+ ·004	− ·23
22	0	− ·036	+ ·16	− ·038	+ ·05	+ ·004	− ·10
23	0	−0·032	+0·25	−0·032	+0·15	+0·007	+0·03

On examining the comparison of the places of individual stars given above (in the first table) it will be seen that there are several cases of abnormal discordance which are not covered by the systematic corrections which have been deduced. The great majority of these appear to arise from inaccuracies in the proper motions adopted in bringing up the places of the stars from the epochs of the catalogues on which their places depend. And if we substitute what must be considered to be more accurate values of the proper motions for those adopted, we find that the abnormal discordances, in almost every instance, are reduced within ordinary limits. Thus, if we confine our attention to the R.A.'s of the Greenwich clock-stars given in the *Nautical Almanacs* for 1883 and 1884 (as these are the most important cases), and if we consider a discordance amounting to $0^s{\cdot}05$ to be an abnormal discordance, we find that there are 24 of these stars whose R.A.'s differ by more than this quantity. Now the adopted proper motions of the great majority of the *Nautical Almanac* stars are taken from Main's and Stone's determinations of proper motions of the stars in Airy's earlier Greenwich Catalogues by comparing their places in those catalogues with Bessel's reduction of Bradley. If for these adopted proper motions we substitute those determined by Auwers from a comparison of his re-reduction of Bradley with modern observations, we get a set of proper motions founded on more accurate ancient places, and with a longer interval for their determination; it would appear, therefore, that they must needs be more accurate. The epoch of the catalogue on which the star places of the *Nautical Almanac* for 1884 are founded is 1872; that on which the *Nautical Almanac* for 1883 depends is some ten years earlier; if, therefore, we apply the correction 10 (Auwers' proper motion − Greenwich proper motion) to the differences *Nautical Almanac* 1883 − *Nautical Almanac* 1884, we correct roughly for errors in the assumed proper motions. Auwers' proper motions have been extracted from *Publicationen der Astronomischen Gesellschaft*, Nos. xiv. and xvii., and the Greenwich values from the Nine-Year Catalogue. The quantities in the column "uncorrected" are the actual discordances; those in the column "corrected" are the outstanding discordances after the application of the correction to the assumed proper motion.

Name of Star.	$\Delta\alpha$ Uncorrected.	$\Delta\alpha$ Corrected.
	s	s
ι Ceti	−0·052	−0·024
β Ceti	− ·055	− ·038
δ Piscium	− ·058	− ·053
ϵ Piscium	+ ·052	+ ·002
θ Ceti	− ·051	− ·049
β Arietis	− ·069	− ·039
o^1 Eridani	− ·053	− ·037
ϵ Leporis	− ·057	− ·063
β Tauri	+ ·057	+ ·040
α Leporis	+ ·050	+ ·029
δ Geminorum	+ ·055	+ ·030
α^2 Geminorum	+ ·068	+ ·047
α Canis Min.	+ ·103	+ ·031
ϵ Leonis	+ ·051	+ ·048
β Corvi	− ·094	− ·047
μ Sagittarii	− ·070	− ·044
ζ Aquilæ	− ·072	− ·038
h^2 Sagittarii	− ·098	− ·102
α^2 Capricorni	− ·055	− ·043
ρ Capricorni	− ·076	− ·044
α Aquarii	− ·061	− ·039
η Aquarii	− ·057	− ·045
ζ Pegasi	− ·069	− ·035
α Piscis Aust.	−0·054	−0·042

In the case of α *Canis Minoris*, Auwers' periodical corrections have been applied in forming "$\Delta\alpha$ corrected." It thus appears that in every case except two the discordances are diminished by the application of the correction, and the mean discordance without regard to sign for these 24 stars is reduced from $0^s{\cdot}064$ to $0^s{\cdot}042$. This appears to me to demonstrate the superiority of Auwers' proper motions, and to show how desirable it is that they, or others equally accurate, should be adopted in this country.

I may also point out that the great majority of cases of discordance in the places of individual stars which Dr. Auwers finds in his comparison of the *Berliner Jahrbuch* for 1883 with the *Nautical Almanac* for the same year (contained in the Supplement to the *Berliner Jahrbuch* for 1884 referred to above) would have disappeared if the comparison had been made for 1884 instead of for 1883. In fact, by choosing the year 1883—the first in which the *Jahrbuch* uses the Catalogue of the

Astronomische Gesellschaft, and the last in which the *Nautical Almanac* uses the Seven-Year Catalogues—Dr. Auwers has taken the most favourable case for the *Berliner Jahrbuch* and the most unfavourable for the *Nautical Almanac*. The comparison would have been more impartial and more useful if 1884 had been the year selected.

Notes and Corrections to Sir John Herschel's Synopsis of all Sir William Herschel's Measures. By Herbert Sadler.

The following notes and corrections to Sir John Herschel's "Synopsis of all Sir William Herschel's Micrometrical Measurements, &c," published in volume xxxv. of the *Memoirs*, may be considered as supplementary to those already published by Sir John Herschel in *Monthly Notices*, vol. xxviii. p. 151, and by Mr. Burnham in vol. xxxiii. p. 567, and vol. xxxiv. p. 98. These, or other notes by Mr. Burnham in the *Monthly Notices* or *Memoirs*, have not been referred to in the present paper, except in one or two cases where obvious misprints in them have been corrected. The original MSS. of Sir William and Miss Caroline Herschel have been most carefully compared with the printed catalogues in the *Philosophical Transactions*, and both of these authorities with the Synopsis itself; and in this revision many errors which had escaped previous notice have been discovered and corrected. The general tenor of these corrections is to show, even more strikingly than before, the marvellous accordance of Sir William Herschel's measures (made with a $6\frac{1}{3}$-inch mirror roughly mounted in the open air, and with rude micrometrical appliances) with the best results of modern instruments, furnished with excellent micrometers, and driven by clockwork.

Many of the identifications have been made with the aid of the $3\frac{1}{4}$-inch Sheepshanks instrument belonging to the Society, and have in all cases been indicated as concisely as possible.

All the stars in the first three classes, with one exception (that of III. 31), have now been identified. Of those which still remain unidentified, three have been measured in position-angle, five in distance, and four only in both coordinates. The position-angles or distances of only a few of the remainder have even been estimated.

CLASS I.

No.

1. Column 5: *for* 1779·687 *read* 1779·816, *for* 1802·019 *read* 1802·074. Column 6: *for* 297° *read* 297° est. Columns 9 and 10: *add* 1779·747, 1″·667; 1780·309, 4″·062— : 1780·320, 2″·968.

3. Column 12: *add* W^{r}. 243.

4. Column 12: "Called by H. 16 *Draconis*." H, however, calls the star 17, *not* 16, *Draconis* in the observation of 1802·827.

7. Column 6: *for* 26°·63 *read* 26°·09.

No.

13. Column 5: *for* 1782·816 *read* 1782·762. Column 12: The star is not S. 770, as printed, or 790, as corrected by Sir John Herschel, but 720.

15. Column 6: The angle 1802·246 is given as 27° 1′ *sp* (242°·98), and with this the diagram agrees, but under date March 12, 1803, H corrects to *nf* (62°·98). The components are probably alternately variable. There is little doubt that 242°·98 is the correct angle.

16. Column 12: The angle is given *nf* in printed catalogue, "Account of the Changes &c."; *np* in second account.

20. Column 6: *for* 200°·95 *read* 200°·05.

21. Column 12: *for* P. ii. 93 *read* P. ii. 89.

23. Column 12: AC. *add* "from a preceding star."

27. Column 6: *for* 234°·20 *read* 234°·80.

28. Column 6: AC. *For* 300°·0 *read* 301°·0. Column 9: *for* 1782·91 *read* 1782·991. The second measure of AC was made with the 20-ft. reflector of $18\frac{3}{4}$-in. aperture.

30. Column 3: *for* ν^2 *Cancri read* σ^2 *Cancri.*

31. Column 12: *dele* Sir J. Herschel's note. Struve gives 39°·40, 1828·59.

33. The angle is given *sf* in the MSS., corrected by Sir John Herschel in MS. note to *nf*. It is 51 *Scorpii*, not *Libræ*.

36. The angle by diagram, date 1782·550, is 20° 42′ *np* not *nf*, but this seems impossible. It is given *nf* in "Account of the Changes." In MSS. H says, "with 460 $\frac{1}{2}$ diam. of S[maller] asunder; bluish white, ash coloured." The angle under date 1803·285 is 26° 49′ *np* or *sf*.

38. Column 12: The angle is given 8° 24′ in "Continuation of an Account, &c."

41. Column 6: *for* 350°·00 *read* 350° est. The place is in error, it should be $17^h\ 42^m\ 17^s + 72°\ 59'\ 10''$.

42. Another measure of date 1782·671, "by the old micrometer" 216°·00. "I suspect a mistake in reading off one of the measures."

46. "Too far asunder for one of the first class."

47. This pair is O. Arg. S. 21208.

48. Column 6: *for* 259°·85 *read* 255°·85. This pair is AC 19.

49. Probably Σ 2880, the place given being 1° in error.

50. Column 6: *for* 311°·20 *read* 311°·20−. I cannot find the measure 312°·77 given under date 1801·704. The MSS. and H. & S. give 312°·43, 1802·665.

54. Column 5: 1802·731, given as 1802·068 in "Continuation of an Account."

60. Cf. a note by Mr. G. Hunt in the "Observatory" for August 1881.

62. Cf. "English Mechanic," February 18 and April 1, 1881, and *Monthly Notices*, xxxvii. p. 280.

67. Column 5: *dele* ·988. Column 6: *dele nf.*

68. Column 12: *add* P. iv. 258.

69. The angle is given as 167°·40 in the MSS. and 167°·00 in the printed Catalogue.

No.

70. Column 12: *add* S. 487.

71. Column 5: *for* 1782·882 *read* 1783·060. Column 12: *dele* Σ 1422. "In Σ hæc stella [1422] = H. I. 71 est posita, auctoritate catalogi mei minoris. Sed hic est error; nam H. I. 71 = Σ 1428 sine dubio." *Pos. Med.* p. C.

72. Column 9: *for* 1782·824 *read* 1782·884.

74. Column 12: *add* 160 P. II. *Trianguli.*

75. Column 12: *dele* Σ 702? and note. It is Σ 700, and is said to be $\frac{1}{4}°$ *sp* 26 *Orionis* (cf. Wollaston's "Specimen of a General Catalogue").

80. Column 5: *for* 1782·101 *read* 1783·101. Column 6: *for* 132°·83 *read* 47°·17. Column 12: *for* 42·83 *read* 47·17.

81. Column 6: *for* 210°·13 *read* 210°·91.

83. Column 5: *for* 1783·350 *read* 1783·183. H. says of the measure of this date, "Note the measure was forgot to be wrote down, but it being the last taken, I find my micrometer stands at . . . 14° 30′ [*nf*], which agrees well enough with the figure, but as the instrument has been touched a good deal it may have been altered."

86. The measure of 1802·742 must refer to some other star. In the MSS. it is said to be "105 *Herculis* borealior;" and yet "it is a star about $1\frac{3}{4}$ deg. from the two stars of 107 *Herculis*; the largest of several.' Cf. H. and S. p. 298; Σ *Cat. Novus*, p. 85; *Mens. Micr.* p. 78.

87. Column 6: *for* 264°·28 *read* 264°·73.

90. Certainly Σ 2781. Cf. "English Mechanic," Aug. 13, 1880.

94. Column 12: *add* "1803 May 28. Near $\frac{1}{2}$ diameter of Smaller. The diameters are full 2 to 1·7 feet."

Class II.

5. Column 12: the angle given 56° 5′ in "Continuation of an Account."

6. Column 12: the angle given 83° 28′ in "Continuation of an Account."

7. Column 5: *for* 1782·378 *read* 1782·463.

8. Column 6: *for* 1781·271 *read* 1781·690.

9. Column 12: *for* Quadruple *read* Treble.

11. Column 5: *for* 1780·161 *read* 1781·882.

12. Column 3: *for* Oct. 17 *read* Oct. 19. Column 10: *for* 5″·00 *read* 5″; and *add* in Columns 9, 10, and 11: 1779·797; 4″·375; 2.

13. Column 10: Sir J. Herschel gives 4″·02? as the measure under date 1780·537; it should be 4″·38.

16. Column 10: *for* 5″·00 *read* 5″.

17. Column 6: *for* 116°·82 *read* 117°·55. Column 7, same line: *for* 1 *read* 2.

22. Column 5: *for* 1781·728 *read* 1782·449.

31. Column 9: *add* 1782·673. Column 10: *add* 10″ or 12″.

32. This is also V 51 (and N 84, as Burnham points out). It is Σ C.G. 2332.

No.

43. Column 8: *add* AC. Column 9: *add* 1782·129. Column 10: *add* 5″ ±. Column 11: *add* est.

51. The angle in 1802 is given as 86° 55′ *sp*, but should evidently be *sf*. There is no diagram given.

52. Column 6: *for* 278°·24 *read* 278°·40.

56. Column 12: it *is* Σ 175. Rectilinear motion.

60. This is Lal. 12755. h 3876.

61. Column 12: *for* Hardy's read Harding's. Σ identifies this pair with his 788.

62. Column 5: *for* 1804·665 *read* 1802·665.

68. Column 6: *for* 261°·60 *read* 81°·60. Column 4: *for* AC *read* $C - \frac{A+B}{2}$. Column 12: *add* AB from ρ *Lyræ* 152°·2, 137″5, 1783·200.

70. Column 3: *for Sagittarii read Sagittæ*. The star is P. xx. 2. *Aquilæ*; wrongly placed in *Sagitta*.

74. Column 12: *dele* note. ♅'s estimates refer to AC, not BC.

87. Cf. "English Mechanic," Aug. 13, 1880, May 13, 1881. It is probably h 2435.

101. This pair is said to be "1° from the star ad 49 am *Camelopardali*," *i.e.* 49 *Cam.* itself, ♅ V. 135. The place given is therefore largely in error. This pair is Σ 1127.

Class III.

1. Column 10: *for* 15″21 *read* 14″·27; *for* 20″·41 *read* 20″·52. Column 9: *for* 1780·521 *read* 1780·134.

2. Column 10: *for* 15″·50 *read* 15″·08.

5. Column 10: *for* 8″·08 *read* 9″·04. Column 11: *for* 1:: *read* 3.

6. Column 5; *for* 1781·882 *read* 1781·966.

7. Columns 9, 10, and 11: *add* 1783·030; 13″·12; 1.

11. Column 9: *for* 1797·753 *read* 1779·753.

14. Column 9: *for* 1780·61 *read* 1780·16.

15. Column 3: *for* 1776 *read* 1779. Column 10: *for* 6″·87 *read* 7″·5. Columns 9, 10, and 11: *add* 1780·521; 6″·87; 1.

18. Column 6: 120°·33 in printed Catalogue, 120°·45 in MSS. Distance 8″·75, under date 1780·216; ♅ says of this measure, "Occulted by the Moon. As fast as I could, lest I should be too late." Distance 6″·25, under date 1780·263. "Very carefully taken, both diameters included, but too large a measure."

19. Column 6: 182°·73, corrected by Sir John Herschel to 181°·44. Correct measure is 181°·73. Column 9: *for* 1781·731 *read* 1781·312.

23. Column 3: *for* "34 *Cassiop.* φ" *read* "near 34 *Cassiop.* φ.' Column 6: *for* 271°·85 *read* 268°·15. This pair is in the cluster VII. 42.

24. The distance of AC is given in the printed Catalogue as 67″·82. In the MSS. 57″·82 is substituted for 67″·82 erased. The latter is undoubtedly right.

26. Column 6: *for* 262°·35 *read* 262°·65.

No.

27. This is *k' Puppis.*

32. Column 6: *for* 238°·60 *read* 238°·42.

33. Column 10: *for* 11″·35 *read* 11″·58.

35. Column 10: *for* 15″·93 *read* 16″·93.

40. Column 6: MSS. give 137°·32 *for* 133°·62. This pair is certainly Σ 2232.

42. Σ *Cat. Novus*, p. 79. "Fortasse hæc (246) = H III. 42." H's diagram converts this suspicion into certainty.

43. This is Σ 914.

46. This is Σ 952.

50. Column 10: 7″·13, *add* "central measure."

55. This is also V. 37. AB of this is BD of *υ Coronæ.*

69. The date of the second measure of position-angle is given 1802·789 in "Continuation of an Account," not 1784·789.

71. Column 6: *for* 125°·24 *read* 125°·40.

72. So. and Σ quote H's angle as 58°·42. The only measure given by H is the one given in the text.

73. Column 6: *for* 180°·60 *read* 180°·80.

76. Column 12: *dele* S 494?

78. This is Σ 414.

80. Column 6: *for* 292°·37 read 292°·40. The R.A. of this star is 1^{m} too small.

83. Column 6: *for* 223°·10 *read* 316°·90; confirmed by diagram.

84. Called 40 *Lyncis* in MSS. and printed Catalogue. Σ 1342, with which Sir J. Herschel and Struve identify it, is a pair near 40 *Lyncis*, for which Σ gives 326°·9; 17″·89; mags. 8·6, 11·0. 39 *Lyncis* has nearly the same R.A., but is 15° north of this. H's measures agree admirably with those of Σ for 39 *Lyncis*; but it cannot be this.

90. Column 10: *for* 13″·60 *read* 13″·10.

91. Column 10: "central measure, not very accurate." This is Σ 379.

94. Σ 688.

96. Column 12: *add* "A third extremely faint star in the same line preceding at three or four times the distance of the other two."

105. Column 12: Σ identifies this with his 2595 in the *Cat. Novus*. Measured at the Washburn Observatory by Burnham.

113. Σ 2630.

114. Σ 953.

Class IV.

2. Struve says (*Cat. Novus*, p. 86), "Suspicor in angulo latere errorem aliquem, quale exemplum jam obtulit *α Cassiopeiæ*." Struve's angle is 84°·96. It is very possibly V 42=Sh 289, 31° 51′ *sp* in H being mistaken for *nf*, and the distance only belonging to *η*.

9. Column 3: *for* 47 *read* 74. Column 12: *add* "an obscure star within about 1½ min."

No.

12. "Σ 2993. Hæc stella est in vicino ψ *Aquarii*, quam Herschelius IV. 12 nuncupat. At ψ' *Aquarii* est duplex classis quintæ, cujus distantia est 50″, cum pro IV. 12 Herschelius dederit distantiam 23″·1. At nostræ stellæ distantia est 26″ secundum cl. Southium. Hinc licet suspicari eam esse H. IV. 12." (*Cat. Novus*, p. 87.)

22. *For* f^1 *read* f^2 *Cygni.* Σ, *Cat. Novus*, p. 87.

24. Column 12: *add* Treble.

26. VIth Class, 1782, October 19.

28. This is the same as IV. 46, 20 *Geminorum*, Σ 924. Wrongly identified in *Memoirs* R.A.S. vol. xl., with O Σ 143.

30. Σ 1369.

31. Probably O Σ 473.

32. Column 6: *for* 90°·00 *read* 90°.

35. Column 10: *for* 25″·90 *read* 25″·90+.

36. Column 6: *for* 273° 274° *read* 266° 267°.

37. Columns 9, 10, and 11: *add* 1781·805; 19″·53; 1.

39. This is O Σ 434, h 614.

59. Column 6 · *for* 200°·60 *read* 210°·80. Column 12: *dele* Sh. 272?

65. Column 6: *for* 258°·60 *read* 228°·80. It is Σ 3022.

73. Column 12: Σ shows the identity of his 586 and 587 in both the *Mens. Micr.* and *Pos. Med.*

74. Column 6: *for* 65°...70° *read* 70°...75°.

77. Column 6: *for* 333°·60 *read* 333°·40.

84. Another measure (which ♅ thinks belongs to another star) 32″.80 "central measure, a little inaccurate," 1782·988. This measure is the better of the two.

85. Column 6: *for* 350° *read* 10°. Column 11, last line, *for* 1 *read* 2.

93. Σ 2431.

95. Possibly Σ 1084.

98. Σ 817.

101. Column 9: *for* 1783·312 *read* 1783·257.

102. Column 5, *for* 1783·895 *read* 1783·224. Column 6: *for* 320°·05 *read* 219°·95. Column 9: *for* 1783·846 *read* 1782·846; *for* 1783·895 *read* 1783·224.

104. Column 10: *for* 15″·95 *read* 18″·95.

105. Column 5: *for* 1785·997 *read* 1802·235.

109. Column 5: *for* 1783· *read* 1783·739.

115. Column 6: *for* 41°·20 *read* 46°·20.

118. Unidentifiable.

121. Column 6: *for* 270°·50 *read* 270° or 271°.

123. Column 5: *for* 1783·293 *read* 1783·627.

125. Column 12: *add* h 2278.

No.

126. Column 5: *for* 1783·288 *read* 1783·621.

132. Column 6: *for* 311°·60 *read* 312°·40.

CLASS V.

3. Column 10: *for* 30″...45″ *read* 30″...35″.

6. Column 12: *for* 69° 23′ *read* 69° 28′; *for* (=339·38) *read* (=339·47).

8. Column 12: The position, however, in the MSS. is given as 97° 37′ or 82° 23′ *nf*, and 79° 37′.

9. Column 10: *for* 35″·42 *read* 33″·42. Column 12: *add* Σ 3124.

22. Column 8: *dele* AB, AC. "Has four or five near, two of which are about 20″ or 30″ from each other."

27. Burnham (Washburn Observations, I. p. 133) identifies this with Sh. 202, the place in ♅h being in error. Column 9: *for* 1781·359 *read* 1782·359.

29. Column 10: *for* 25″...30″ *read* 30″...35″. Column 12: *for* Σ C.P. 452 *read* Σ C.P. 542.

32. Column 6: *for* 280° 62 *read* 259°·38. Column 10: *for* 55″·70 *read* 55″·70+.

40. Column 6: *for* 350° ± *read np*.

50. Column 4: *for* AB *read* BC. Column 8: *for* AB *read* BC. Column 12: *for* AC *read* AB.

51. The same as II. 32.

57. Column 9: *for* AC *read* AB. This is the same as V. 113. It is 26 (Bode) *Orionis*; P IV. 257.

62. This is not 57 *Leonis*, but S. 617.

63. This *is* Bode 91.

64. Column 9: *for* 1785·096 *read* 1783·096.

65. Column 12: *add* Quadruple.

67. This cannot be So. 560, the distance of which, according to So., is 90″·6.

Sir John Herschel queries the identity in So.'s Catalogue.

70. Column 6: *for* 277°·00 *read* 263°·00. Column 12: *add* Θ Σ 268, h 2657.

72. Column 12: *add* Σ 2074.

76. Columns 9, 10 and 11. *Add* 1783·600; 33″·27; I::.

77. Column 3, *for* 214 *read* 215. Cf. Sir J. Herschel in *Memoirs* R.A.S., xl. p. 141.

79. Column 12: *for* Camelop. *read* Cassiop. It *is* 9 *Cassiopeiæ*.

81. Column 12: *for* Σ C.P. 37 *read* 36.

84. This is Σ C.P. 52; ΘΣΣ 22. S 405. Not 47 *Cass*.

85. This is certainly Σ C.P. 6. The star is Lalande 335.

88. Probably the same as V. 22, *q. v.*; it is described as being near λ *Aurigæ*, 3′ or 4′ *nf* it. Cf. So. 472 A–C.

90. Column 6: *for* 331°·80 *read* 208°·20.

No.

96. This is almost certainly the same as h 3122; the R. A. being $1^m\ 20^s$ too large, and the N.P.D. 1° 14′ too great in ♅ h; h 3122 is W. M. T. Z. 147, No. 1.

99. Column 6: *for* 0°·60 *read* 0°·80.

102. Column 11, line 1: *for* 1 *read* est. "Too low to call it a measure."

104. Column 12: *add* "40′ *sp* ε *Sagittæ*."

108. Column 12: *add* Δ 36.

109. Column 12: *add* h 785.

110. Column 5; *for* 1783·320 *read* 1783·740.

112. Column 12: *add*—This is Σ cat. generalis 746 = Σ C.P. 233, $6^h\ 26^m\ 53^s{\cdot}8$ νπδ 67° 47′ 7″ (1880).

113. = V. 57; = *Orionis* 26 (Bode); = 257 P. iv. *Tauri*; = Σ C.P. 144; = Sh. 49.

115. Column 12: *to* "central measure" *add* "inaccurate." It is h 365.

116. = VI. 5 with a closer *comes*.

122. Column 6: *for* 157°·6 *read* 157°·1.

124. This is *Lacaille* 4726. Howe has found the principal star to be a close pair. ♅'s distance marked "very inaccurate."

128. Column 10: *for* 41″·80 *read* 41″·96.

131. Column 12: *add* P. xv. 14.

135. This is Σ 1122. Column 9: *add* 1783·268. Column 10: *add* 14″·78. Column 11: *add* 1. Column 12: *add* "perhaps a little inaccurate," To the measures of 1783·734 the following note is appended. "The observation page 371 [1783·268] and this observation do not agree; nor can I surmise what could occasion the mistake of 371." The observation of page 371 is, however, the correct one, that of 1783·734 being in error in distance; Σ gives 4°·87 : 15″·460 : 1830·59, agreeing excellently with ♅'s 185°·00 : 14″·78 : the stars being of equal magnitudes, $7^m{\cdot}1$, according to Σ.

137. Column 9: *for* 1783·803 *read* 1783·808.

Class VI.

1. Column 6: on one side of the page in the MSS. the angle is given as 92°·53, on the other side as 92°·20. Sh. give 92°·20. Column 10: the distance 107″·83 is the mean of two, 105″·16 and 110″·468, the latter being marked "better"; the distance 111″·72 is the mean of two, 112″·812 and 110″·625, the latter being marked "too small"; *for* 110″·00 *read* 110″. To the observation of 1780·687 ♅ appends the following note: "Colour of a dark red ink, but darker than I can recollect to have seen any star."

2. Sh. give ♅'s distance 1781·641 as 50″ 6‴, but it is clearly written 50″ 18‴ [50″·30] in the MSS., and with this the printed Catalogue agrees.

4. Column 3: *dele* 5 and 6 *Capric.* α. This is not α *Capricorni*, but a faint and unequal pair preceding α^1 and α^2.

5. Column 12: *add* this is AC of V. 116.

6. Column 12: *add* this is h 3040.

8. Column 12: *add* Σ 9, App. I.

No.

10. Column 6: *add sf* 1781·800, and with this the whole subsequent history of the star agrees. The angle in 1781·827 should evidently be 176°·23.

11. Column 5: *add* 1781·838. Column 6: *add* 305°·08. Column 7: *add* 2.

12. Column 12: *for* 73° 20′ *read* 73° 29′.

13. Column 6: *for sf read* 10° ±.

14. Column 10: *for* 81″·33 *read* 81″·03.

15. Column 12: *add* Identical with VI. 89.

17. Column 9: *dele* 1781·786. Column 10: *dele* 128″ ±. Column 11: *dele* est.

20. Column 12: *add* O Σ 73 (with close *comes*).

22. Column 12: *add* This is Σ 1752, close pair.

26. Column 6: *for* 98°·53 *read* 81°·47. Column 12: *add* "should be *nf* by diagram."

30. Column 12: *add* diameter of *Capella*, by two measures, 2″·86, 1780·682. *For* 61·23 *read* 61° 23′.

32. Column 12: *add* O Σ 413; close pair.

38. Column 3: *for* 64 *Draconis read* 65 *Draconis*. Column 12: *add* O Σ Σ 200.

39. Columns 5 and 9: *for* 1786·882 *read* 1781·882.

42. AC. The angle 74°·30 has been erased in the MSS. and 74°·07 substituted. The distance of AC is given as 197″·31 in the printed Catalogue, and in the MSS. these figures have been erased and 160″·70 substituted. Column 12: *add* "Has three stars following."

44. The angle in the printed Catalogue is 112°·52 and in the MSS. 112°·50; 31′ being altered with the pen to 30′. Cf. "English Mechanic," Sept. 21, 1883.

51. Burnham in his Sixth Catalogue identifies this with 1, not 2, *Serpentis*.

54. Unidentifiable. It is *not* III. 25.

57. Column 12: *add* S. 799.

60. Column 12: *dele* Triple. It may be V. 47.

63. "A third nearly in the same direction and a little more than twice the distance."

65. 15 *Monocerotis*.

66. Column 12: *add* diameter by mean of 5 measures: 1781·972: 1″·37.

67. Column 12: *add* Dawes 5; close pair.

68. Lal. 10165.

77. Column 12: *add* central measures.

89. Column 12: *add* P. xiii. 219, 220.

91. In the field with γ *Geminorum*, 3′ or 4′ north of it. Triple 20 ft.

93. Column 5: *for* 1873·633 *read* 1783·633.

96. Column 12: *add* Σ 464.

98. Column 12: *add* P. iv. 24, 25; O Σ Σ 45.

100. Column 12: *add* O Σ Σ 238.

No.

105. Column 10: *for* 111″·48 *read* 101″·48.

112. The angle is given as 277°·4 in MSS. and printed Catalogue; should be diminished by 180°, and be 97°·4. 82°·60 is clearly wrong.

113. Column 10: *for* 205″·73 *read* 145″·73. Column 12: *for* Σ 394 *read* ΣC.P. 394; and *add* Sh. 131. This star is called ξ *Virginis* by Sh.

117. Burnham in his Tenth Catalogue identifies this with S. 663, there being an error of 16′ in the Decl. of $\frac{H}{h}$.

120. Column 8: *add* AB. Column 9: *add* 1783·622. Column 10: *add* 84″·15. Column 11: *add* 1. Column 12: *add* P. xix. 67.

145 New Double Stars.

8. Column 12: *add* Σ 2769.

26. This is 36 *Crateris*. The place is in error.

28. Column 12: *add* P. xiv. 212.

49. Column 12: *add* h 4256. A.C. 8 (close pair).

50. Column 12: *add* h 4321.

67. Column 12: *add* Σ 550.

70. Column 12: *add* Sh. 126.

74. Column 12: *add* h 947.

76. Column 12: *add* O Σ 14.

81. Burnham (*Memoirs*, R.A.S. xlviii. p. 289) identifies this with ν′ *Coronæ*.

85. Σ 2521.

86. O Σ 401.

89. Column 12: *add* Σ 2687, S. 753.

93. Column 12: *add* Σ 479.

94. O Σ 168 *rej.*

97. Column 12: *for* H. V. III. *read* H. V. iii.

101. According to Cincinnati Observations V. this is W. Mural Circle Z. 134, No. 133.

102. Measured in Cincinnati Observations VI.

117. Column 12: *add* h 5356.

130. Σ 2826.

134. Σ 2699 is near.

135. h 3151.

138. According to Burnham this is O. Arg. 20475, but in Cincinnati Observations vi. it is W. C. 8814.

143. Σ 1668.

1885, *March* 11.

On the Value of the Long Inequality in the Motion of the Moon due to the Disturbing Action of the Planet Mars. By Edmund Neison.

In the *Monthly Notices* for November (vol. xlv. p. 1) there is a communication by M. Gogou on the difference between the values found by us for the coefficient of the long inequality in the motion of the Moon with the argument: the mean motion of the Moon plus twenty times the mean longitude of *Mars* minus twenty-four times the mean longitude of the Earth.

The difference between M. Gogou and myself may be briefly stated thus. Whilst we both agree that the true value of the coefficient of this term when found *in this way* is only a small fraction of a second of arc, whereas M. Gogou's computations lead to values amounting to less than one thousandths of a second of arc, mine lead to values nearly a thousand times greater—to almost as large a quantity as that found in a similar way by M. Delaunay for the coefficient of the term of similar character due to the action of *Venus*, and having the argument: eight times the mean longitude of *Venus* minus thirteen times the mean longitude of the Earth.

There is more attached to this difference, *as thus stated*, than is thought by M. Gogou, who assumes it to be immaterial, as may be seen by an examination of the origin of the similar discordance between the values obtained by Hansen and Delaunay for the coefficient of the *Venus* term already mentioned.

As M. Gogou's calculations have been carried out with so much care, skill, and elaborateness, I should have been disposed to look for the source of this remaining discordance in some unsuspected deficiencies in my own far less elaborate work. But an examination of his memoir indicated a more probable origin. It was this. In calculating the values of the coefficients denoted by B, I retained the terms depending on the fifth and seventh powers of the eccentricities of *Mars* and the Earth, but in his calculation M. Gogou has omitted to do this. This I pointed out in my Note in the *Monthly Notices* for March 1882 (p. 266), and it seemed to me to offer a most probable explanation of the difference between my revised results and those of M. Gogou. I say revised results, for I had already in the *Monthly Notices* for March 1878, or four years earlier, pointed out that the very large value given in my first communication, in November 1877, was far too great, as the ordinary methods of calculating the coefficients b^i which I had employed were not sufficiently accurate for this special term.

In his present communication, M. Gogou returns to the consideration of this point and calculates the effect of certain small subsidiary terms of the fifth order, which were included by me in my calculations, but were omitted by him from his own investigations. He shows that the omission of these terms fails to account for the existing discordance.

But this result is really beside the question, for as a reference to my Note will show, it is clearly not to these terms of the fifth order to which I allude in my remarks. M. Gogou has failed to see the point of my criticism, as, indeed, my reference to terms of the seventh order might have shown him had he not disregarded it.

I will, therefore, now make my meaning unmistakable.

When we expand Δ^{-s}, or the s^{th} power of the reciprocal of the geocentric distance of *Mars* in the form of the series

$$(a''')^{-s}\Sigma\left[B_{\frac{s}{2}}\right]^{i}_{i+k}\cos\{[in''-(i+k)n''']t+E\},$$

the coefficients have the form

$$\left[B_{\frac{s}{2}}\right]^{i}_{i+k}=(e''')^{k}(e'')^{i-k}\{N_0+N_1(e''')^2+N'_1(e'')^2+N_2(e''')^4 + N'_2(e''')^2(e'')^2+N''_2(e'')^4+\ \ldots\}$$

where N_0, N_1, N_1' . . . are numerical coefficients.

In the ordinary development of the planetary theory, the terms involving N_1, N'_1, &c., are very much smaller than the first term depending on N_0, and can be neglected, therefore, in nearly every case. But in the present case this is by no means true, for owing to the large value of i, and the magnitude of both a and e''', the terms depending on N_1 and N_2 are nearly as large as that depending on N_0. They must therefore be retained. Now, this is what I have done, but it is what M. Gogou has omitted to do.

It must not be supposed that this omission is necessarily unimportant, because as the terms depending on N_0 are so small, even if those depending on N_1 were as large, their sum would still be unimportant. The results depending on ${N_0}^k$ are small, putting ${N_0}^k$ to denote the value of N_0 in the coefficient

$$\left[B_{\frac{s}{2}}\right]^{i}_{i+k},$$

because of the mutual relations between them. But as the same relations do not exist amongst ${N_1}^k$ as amongst ${N_0}^k$, it is easy to see that the mutual relations which destroy the one will not destroy the other. Hence the terms in N_1 ought to yield far larger results than the terms in N_0.

It is to this difference in our investigations that I ascribe the existing discordance in our results, I having retained many more terms in my calculations than have been included by M. Gogou in his more detailed and elaborate work.

I must add that having neither M. Gogou's memoir nor my own calculations of this term with me in Natal, I am quite unable until my return to England to separate these different portions of my work, and so clearly prove the accuracy of this view of the origin of the discordance between our results.

The complete value of the coefficient of this term practically depends on two functions—one arising from the direct action of *Mars* on the motion of the Moon as disturbed by the action of the Sun; and the other depending on the direct action of the

Sun on the perturbations in the motion of the Moon produced by the action of the planet.

In the preceding remarks I have confined myself to the former of these two portions, as it is the sole one which has been dealt with by M. Gogou, who, like Delaunay, has overlooked entirely the second more important portion. It is this second portion which forms the only real difficulty in the accurate calculation of the terms of this kind. It is the omission of this second portion by Delaunay which explains the discordance between him and Hansen with regard to the values of the long inequalities due to *Venus*, and it is the calculation of this second portion which seems to have so completely baffled Hansen in his attempt to deal with it in a numerical form.

But until this additional portion has been properly computed it cannot be said that the value of this term has been shown to be insensible, as believed by M. Gogou.

I had hoped to have ere this finished and published a complete determination of the real values, not only of this term, but also of both Hansen's terms of long period; but being unable out here in Natal to obtain a copy of Pontécoulant's *Théorie de la Lune*, a number of whose developments I have used in my subsidiary calculation, I am forced to delay this until I have recalculated nearly the whole of these developments—probably nearly a year's additional work.

Natal Observatory:
1885, *Feb.* 3.

Observations of Barnard's Comet (*b* 1884) *made at the Natal Observatory, Durban.* By Edmund Neison.

In the telegram sent to this Observatory on July 22, the North Polar Distance of this comet was erroneously given as 120° instead of 127°; so, though looked for most carefully, it was not discovered before the night of August 11. It was a faint, rounded, nebulous mass, with a central condensation. Sketches were made of the appearances of the comet on the nights of August 12 and 21, and September 13 and 16. The following notes were also recorded.

August 12.—Round hazy body with a hazy nucleus, and a faint tail-like extension.

August 16.—Very faint. Rounded preceding edge and faint tail. No distinct nucleus.

August 18.—Comet faint nebulous mass, without definite edges or nucleus. Slight evidence of tail on following side.

August 21.—Comet very faint. About 2′ in diameter. Two tiny points of light in the centre resembling 15-magnitude stars, which they probably were.

September 13.—Comet about 2′ in diameter, and decidedly condensed towards the centre.

September 16.—Comet seemed to glitter in the condensed centre as if there were one or two nuclei, or possibly very small stars, shining through the comet, as a number of faint stars were visible near. Diameter 2′·5; of condensed portion 0′·9. Slight trace of tail follows the condensed nucleus.

September 18.—Comet $3\frac{1}{2}'$ in diameter. Nearly round, and brighter than before. Decided nucleus.

Ten days' cloudy weather stopped further observation. On September 28 and 29 the comet was too near the Moon to be visible. Then cloudy weather intervened till November 4, when the comet was no longer visible.

The following observations were made with the parallel-wire micrometer of the 8-inch Equatorial of the Natal Observatory. The apparent centre of the condensed portion of the comet was observed. Owing to the very limited range of the micrometer, which is better suited for double star than for cometary work, some difficulty was found in finding comparison stars. The observations need no correction for refraction.

Apparent Places of Barnard's Comet.

Date. 1884.	Durban Mean Time.	App. R.A. 1884.	Log. Par. Factor.	App. Decl. 1884.	Log. Par. Factor.	Comp. Star.
	h m s	h m s		° ′ ″		
Aug. 12	10 30 8	17 1 49·90	8·6989	−36 43 52·3	8·3347	*a* & *b*
16	11 28 15	17 17 8·61	8·7873	−36 20 41·1	9·1123	*c*
18	11 10 52	17 24 44·21	8·7646	−36 7 39·4	8·9999	*d*
20	9 48 8	17 32 25·06	8·5957	−35 52 17·5	8·3641*n*	*e*
21	10 47 0	17 36 35·84	8·7257	−35 43 30·8	8·8109	*e*
Sept. 13	10 5 59	19 11 48·30	8·6044	−30 27 14·8	8·8736	*f*
16	10 13 34	19 23 52·18	8·6314	−29 18 20·8	9·0280	*g*
16	10 25 35	19 23 55·14	8·6316	−29 18 17·3	9·0274	*h*
18	9 44 42	19 31 39·46	8·5362	−28 38 5·8	8·8989	*i*

Comparison Stars.

No.	Name.	Authority for Adopted Place.	Adopted R.A.	Mean Decl. (1884)	Reduction to Apparent Place.
			h m s	° ′ ″	s ″
a	Lacaille 7123	Cape Cat. 80 (Stone)	16 58 30·00	−37 3 58·1	+3·80 + 1·2
b	Lacaille 7113	„ „	16 57 54·70	−36 34 41·5	+3·80 + 0·8
c	✶ Anon.	Cape Tr.Cir.Obs.1884	17 16 53·80	−36 20 56·9	+3·88 + 0·7
d	✶ Anon.	„ „	17 24 19·28	−36 4 18·8	+3·83 + 1·6
e	✶ Anon.	„ „	17 34 30·33	−35 44 24·9	+3·83 + 2·6
f	✶ Anon.	Gould's Zone Obs.	19 10 19·82	−30 33 43·1	+3·62 +11·4
g	✶ Anon.	„	19 23 48·61	−29 18 33·3	+3·57 +12·5
h	✶ Anon.	„	19 23 50·59	−29 10 13·8	+3·57 +12·5
i	Lacaille 8175	Cape Cat. 80 (Stone)	19 31 41·78	−28 52 4·7	+3·55 +13·2

Each place of the comet is founded on ten comparisons in Right Ascension and ten in North Polar Distance.

Natal Observatory:
1885, *Feb.* 3.

Spectroscopic Results for the Motions of Stars in the Line of Sight obtained at the Royal Observatory, Greenwich, in the year 1884. No. VIII.

(*Communicated by the Astronomer Royal.*)

The results here given are in continuation of those printed in the *Monthly Notices*, vol. xxxvi. p. 318, vol. xxxvii. p. 22, vol. xxxviii. p. 493, vol. xli. p. 109, vol. xlii. p. 230, vol. xliii. p. 81, and vol. xliv. p. 89. The observations were made with the "half-prism" spectroscope, one "half-prism" with a dispersion of about $18\frac{1}{2}°$ from A to H being used, except in a few cases of bright stars, mentioned in the Remarks, where a train of two "half-prisms" with a dispersion of 80° from A to H was used. An eyepiece with a magnifying power of 14 was employed throughout.

The cylindrical lens has always been used in front of the slit as in the observations made previously to 1881. A slip of metal coated with Balmain's luminous paint inserted immediately behind the measuring pointer has been frequently employed to give a phosphorescent illumination of the field.

The observations of the Moon and of the sky spectrum have been made as a check on the general accuracy of the results.

The bright Hβ line in the spectrum of γ *Cassiopeiæ* was much fainter in 1884 than when observed in 1880, 1881, and 1883. It seemed also fainter for the observations made in September than for those made in August.

Motions of Stars in the Line of Sight, in Miles per Second, observed with the Half-prism Spectroscope.

(+ denotes Recession; − Approach.)

The initials M and N are those of Mr. Maunder and Mr. Nash respectively.

Date. 1884.	No. Obs.	of Meas.	Line	Earth's Motion in M per sec.	Concluded Motion of Star. Meas.	Estimd.	Remarks.
				α Andromedæ.			
Aug. 7	M	2	F	−13·5	+ 4·2	− 1·4	Definition fair.
11	M	3	F	−12·9	−13·5	− 9·2	Star-line fairly well defined.
12	N	2	F	−12·7	−30·9	−34·9	Star-line faint.
25	M	2	F	−10·3	−21·6	−18·0	Definition fair.
Sept. 4	M	2	F	− 8·1	−29·9	−27·1	Definition fair.
10	M	2	F	+ 6·6	−22·1	−19·2	Definition fair.

Date. 1884.	Obs.	No. of Meas.	Line.	Earth's Motion in M. per sec.	Concluded Motion of Star. Meas.	Estimd.	Remarks.
Sept. 18	M	2	F	− 4·6	−15·2	−12·5	Definition fair.
20	M	4	F	− 4·0	− 6·3	− 2·4	Definition poor.
Oct. 22	M	2	F	+ 5·0	−16·9	−24·3	
24	M	2	F	+ 5·6	−20·7	−17·0	Star-line fairly well seen.
28	N	2	F	+ 6·7	−13·6	−12·3	
Nov. 6	M	2	F	+ 9·0	−47·3	−37·1	Definition good.
15	M	2	F	+11·2	−33·2	−37·8	Star-line not well defined.
Dec. 17	M	4	F	+16·4	−39·8	−32·2	Measures considered rough.
				β Cassiopeiæ.			
July 21	M	1	F	−11·1	− 6·2	− 9·9	Images very steady.
Aug. 7	M	2	F	−10·9	+12·6	+13·1	Spectrum exceedingly faint.
11	M	2	F	−10·8	+41·6	+33·6	Spectrum and star-line very faint.
14	N	2	F	−10·6	+22·6	+23·3	Spectrum very faint.
25	M	2	F	− 9·8	−33·0	−24·8	Definition poor.
Sept. 4	M	2	F	− 8·7	+ 9·1	+ 8·7	Star-line fairly well defined.
10	M	2	F	− 8·0	−26·8	−27·1	Star-line very faint.
11	N	3	F	− 7·9	+10·5	+13·8	
18	M	2	F	− 6·8	+ 9·9	+10·0	Definition good.
20	M	2	F	− 6·5	−24·5	−14·9	Definition fair.
				γ Pegasi.			
Aug. 12	N	2	F	−12·7	+10·1	+12·7	
Sept. 4	M	2	F	− 7·4	−11·8	−10·9	Measures rough.
10	M	2	F	− 5·7	−37·2	−32·2	Measures rough.
18	M	5	F	− 3·4	− 5·7	− 3·0	Star-line ill defined.
20	M	2	F	− 2·8	+20·1	+26·9	Definition poor.
Oct. 28	N	3	F	+ 8·7	−48·7	−48·7	Star-line very faint.
Nov. 6	M	2	F	+11·1	− 0·5	+ 4·4	Definition fair.
				γ Cassiopeiæ.			
Aug. 11	M	2	F	−11·7	−16·9	−14·2	Star-line fairly well defined.
25	M	2	F	−11·1	− 1·5	− 4·6	Definition very bad.
Sept. 4	M	2	F	−10·3	− 2·2	− 0·3	Measures very difficult.
10	M	2	F	− 9·6	−20·6	−19·9	Measures exceedingly rough.
11	N	2	F	− 9·5	−39·1	−39·6	
18	M	2	F	− 8·6	−26·2	−15·0	Star-line seen with greatest difficulty.
20	M	2	F	− 8·3	−14·4	− 7·7	Star-line faint.

Date. 1884.	No. Obs.	of Meas.	Line.	Earth's Motion in M. per sec.	Concluded Motion of Star. Meas.	Estimd.	Remarks.
				δ Cassiopeiæ.			
Aug. 11	M	2	F	−12·3	+ 9·6	+ 9·2	Star-line well defined, but spectrum faint.
14	N	2	F	−12·3	+ 2·0	+ 3·9	
Sept. 11	N	2	F	−10·5	+ 5·7	+ 2·1	
18	M	2	F	− 9·6	−33·7	−25·7	Spectrum faint.
20	M	2	F	− 9·3	−22·6	−17·5	
				β Arietis.			
Feb. 21	M	2	F	+17·6	−55·0	−55·7	
Nov. 6	M	2	F	−10·9	−14·7	− 5·5	
				α Arietis.			
Nov. 20	N	2	F	+ 7·3	+ 4·9	+ 6·4	
				γ Persei.			
Feb. 15	M	2	F	+15·5	−49·1	−51·3	Star-line a difficult object.
21	M	2	F	+15·4	+31·7	+30·3	Star-line faint and very ill defined.
				β Persei.			
Feb. 15	M	4	F	+17·4	−44·0	−50·7	Star-line difficult to bisect.
Aug. 11	M	2	F	−16·5	+ 9·2	+10·3	Spectrum faint, but star-line fairly well defined.
Sept. 10	M	2	F	−15·3	+33·8	+34·2	Star-line seen with difficulty.
18	M	2	F	−14·3	+39·4	+38·4	Spectrum fairly well seen.
Oct. 24	M	2	F	− 6·6	+20·9	+26·0	Star-line very difficult to see.
28	N	2	F	− 5·5	− 2·4	+ 7·5	Star-line broad & diffused
Nov. 6	M	2	F	− 2·9	−27·9	−20·5	
7	N	2	F	− 2·6	−10·1	−11·1	
8	M	2	F	− 2·3	−10·6	−14·2	Star-line not well defined.
20	N	2	F	+ 1·4	−25·7	−28·7	
Dec. 17	M	3	F	+ 9·3	−66·0	−52·7	
				α Persei.			
Feb. 15	M	2	F	+16·2	−66·7	−67·8	Star-line difficult to bisect.
Sept. 10	M	2	F	−14·9	−22·7	−27·2	Star-line fairly well seen.
18	M	2	F	−14·2	+ 3·9	+ 6·2	Definition fair.
Oct. 24	M	2	F	− 7·7	−12·4	− 6·0	Star-line very faint.
28	N	2	F	− 6·7	−53·5	−56·3	
Nov. 7	N	2	F	− 4·0	−35·5	−36·9	
8	M	4	F	− 3·8	− 0·2	0·0	Star-line very ill defined.
Dec. 17	M	2	F	+ 7·2	−34·9	−30·8	

Date. 1884.	Obs.	No. of Meas.	Line.	Earth's Motion in M. per sec.	Concluded Motion of Star. Meas.	Estimd.	Remarks.
				δ Persei.			
Nov. 8	M	2	F	− 4·7	+30·3	+36·4	Star-line faint, but well defined.
				η Tauri.			
Feb. 15	M	2	F	+18·8	−40·7	−40·3	Measures difficult.
Nov. 8	M	2	F	− 3·7	+ 4·0	+ 3·7	Star-line faint, but well defined.
20	N	2	F	+ 0·3	−31·6	−31·9	
				Aldebaran.			
Jan. 24	M	2	F	+15·7	+17·4	+19·4	Star-line seen with difficulty.
Feb. 6	M	2	F	+17·6	+ 9·0	+10·5	Spectrum tremulous; star-line ill defined.
15	M	2	F	+18·4	+ 8·6	+16·0	Definition good.
21	M	2	F	+18·6	+17·5	+22·6	Definition very bad.
Mar. 12	M	2	F	+17·9	+46·7	+27·9	Definition very bad.
20	N	2	b_1	+17·0	+ 2·7	+ 4·3	
24	M	2	b_1	+16·4	+26·8	+24·5	Star-line very faint.
Nov. 8	M	4	F	− 6·7	+57·2	+54·2	Star-line faint and difficult to bisect.
20	N	2	F	− 2·9	+ 8·4	+ 7·1	Spectrum tremulous. Star-line faint.
Dec. 15	M	2	F	+ 5·3	+34·7	+29·8	Star-line ill defined.
17	M	2	F	+ 6·0	+18·0	+16·0	Star-line very faint.
				Capella.			
Feb. 11	M	2	F	+15·4	+22·4	+37·0	Star-line well defined.
15	M	2	F	+15·9	+11·8	+12·7	Star-line very well defined.
29	N	2	F	+17·0	−12·3	− 9·4	Measures doubtful. Sky hazy.
Mar. 20	N	2	b_1	+16·8	− 1·8	+ 1·5	Measures difficult.
29	N	2	b_1	+16·0	+11·6	+ 9·8	
Nov. 8	M	2	F	− 9·4	+36·1	+44·9	Star-line fairly well seen.
Dec. 15	M	2	F	+ 1·3	−11·8	−10·3	Small, but unmistakable displacement towards the *blue*.
17	M	2	F	+ 1·9	+15·5	+21·2	
				Rigel.			
Jan. 24	M	2	F	+12·3	− 5·3	− 3·2	Star-line not well seen.
28	M	2	F	+13·0	+12·4	+24·4	Measures considered good.
Feb. 6	M	2	F	+14·3	+ 5·4	+ 3·3	Spectrum tremulous; star-line fairly distinct.
11	M	2	F	+14·9	+44·7	+54·9	
12	N	2	F	+15·0	+21·8	+16·1	

Date. 1884.	Obs.	No. of Meas.	Line.	Earth's Motion in M. per sec.	Concluded Motion of Star. Meas.	Estimd.	Remarks.
Feb. 15	M	2	F	+15·3	+19·8	+23·4	Definition very good.
18	M	2	F	+15·5	+ 0·2	+ 0·9	Two prism train. Star-line difficult to see.
21	M	2	F	+15·7	+19·6	+20·9	Star-line only well seen by glimpses.
Mar. 12	M	2	F	+15·8	+23·7	+17·8	Star-line difficult to see.
Nov. 20	N	2	F	− 4·4	+41·8	+39·5	
Dec. 15	M	2	F	+ 2·6	+13·0	+12·4	Star-line seen well defined by glimpses.
17	M	2	F	+ 3·2	+22·0	+20·4	Star-line faint.
					γ Orionis.		
Jan. 28	M	2	F	+13·7	+ 3·0	+ 8·8	Spectrum bright and fairly steady.
Feb. 11	M	4	F	+16·1	+ 9·2	+ 8·7	
15	M	2	F	+16·6	+ 1·8	+ 9·2	Definition good.
18	M	2	F	+17·0	−11·7	−10·2	Two prism train. Star-line faint.
21	M	2	F	+17·2	+ 0·9	+ 3·4	Star-line fairly well seen.
Mar. 10	M	2	F	+17·8	− 7·5	−10·7	Star-line fairly well defined.
12	M	2	F	+17·8	−10·2	−11·0	Definition poor.
Dec. 15	M	2	F	+ 1·7	−13·1	−10·7	Star-line fairly defined.
17	M	4	F	+ 2·4	− 4·1	− 2·9	Spectrum unsteady and star-line faint.
					β Tauri.		
Jan. 28	M	2	F	+13·9	−11·8	− 9·8	Measures considered good.
Feb. 11	M	2	F	+16·5	−38·5	−42·2	Star-line well defined.
12	N	2	F	+16·7	−21·1	−25·5	
15	M	4	F	+17·1	−14·1	−15·0	Definition fair.
18	M	2	F	+17·4	−24·6	−31·5	Two prism train. Measures difficult.
21	M	2	F	+17·7	−29·6	−38·3	Star-line well seen.
Mar. 10	M	2	F	+18·5	−38·6	−33·9	Star-line fairly well defined.
12	M	2	F	+18·5	−19·6	−18·5	Definition poor.
Dec. 15	M	2	F	+ 1·2	−22·0	−19·2	Star-line fairly defined.
17	M	2	F	+ 1·9	−31·8	−25·5	Spectrum bright and fairly steady.
					δ Orionis.		
Jan. 28	M	2	F	+12·8	−44·0	−40·4	Star only seen by glimpses.
Feb. 11	M	2	F	+15·2	−14·8	−11·7	Star-line very faint and ill defined.
15	M	2	F	+15·7	+ 9·8	+12·3	Star-line faint but seen well by glimpses.
18	M	2	F	+16·0	+14·8	+16·8	Two prism train. Star-line exceedingly faint.
Dec. 15	M	2	F	+ 1·2	− 8·6	− 7·2	Measures considered rough.

Date. 1884.	Obs.	No. of Meas.	Line.	Earth's Motion in M. per sec.	Concluded Motion of Star. Meas.	Estimd.	Remarks.
				ε Orionis.			
Feb. 11	M	2	F	+15·0	−20·5	−18·5	Star-line very faint and ill defined.
15	M	2	F	+15·5	+24·2	+27·5	Star-line faint, but seen well by glimpses.
18	M	2	F	+15·9	+ 5·1	+11·4	Two prism train. Measures considered fairly good.
Dec. 15	M	2	F	+ 0·8	+ 4·7	+ 6·8	Star-line only seen well by glimpses.
				ζ Orionis.			
Feb. 11	M	2	F	+14·7	−26·7	−28·7	
15	M	2	F	+15·2	−11·9	− 6·6	Star-line faint, but seen well by glimpses.
18	M	2	F	+15·6	− 2·4	− 1·6	Two prism train. Measures considered fairly good.
Dec. 15	M	2	F	+ 0·5	+19·4	+20·6	Star-line only seen well by glimpses.
				κ Orionis.			
Feb. 11	M	2	F	+13·4	− 8·9	+ 0·6	Star-line too faint for satisfactory measures.
15	M	2	F	+13·9	+14·1	+11·9	Star-line faint, but seen well by glimpses.
				α Orionis.			
Mar. 20	N	3	b_1	+17·7	+31·2	+29·9	Star-line broad and diffused.
24	M	4	b_1	+17·6	+35·9	+33·5	Definition good.
				β Aurigæ.			
Feb. 2	N	1	F	+12·4	−14·8	−12·4	Spectrum faint.
15	M	2	F	+14·8	− 3·2	− 1·9	Measures considered good.
Dec. 17	M	2	F	− 0·6	−14·8	−15·2	Star-line broad and ill defined.
				γ Geminorum.			
Feb. 15	M	2	F	+14·2	−30·8	−29·3	Star-line seen well.
Mar. 10	M	2	F	+17·7	+15·7	+14·3	
15	M	2	F	+18·0	−26·5	−27·6	Star-line well seen, but a *most* difficult one to bisect.
				Sirius.			
Jan. 24	M	2	F	+ 5·5	−16·2	−16·4	Definition bad.
28	M	3	F	+ 6·4	− 5·5	− 6·6	Spectrum very tremulous.
Feb. 6	M	4	F	+ 8·4	−31·9	−26·2	Spectrum tremulous; clouds passing.
11	M	4	F	+ 9·4	−36·8	−34·2	
12	N	2	F	+ 9·6	−31·9	−30·6	Spectrum tremulous.
15	M	4	F	+10·1	−33·0	−30·9	Star-line slightly displaced towards the *blue*.

Date. 1884.	Obs.	No. of Meas.	Line.	Earth's Motion in M. per sec.	Concluded Motion of Star. Meas.	Estimd.	Remarks.
Feb. 18	M	4	F	+10·6	−17·6	−22·3	Two prism train. Measures considered satisfactory.
Mar. 10	M	4	F	+13·3	−36·4	−35·2	Star-line very ill defined.
12	M	4	F	+13·5	+ 3·3	+ 0·2	Star in much mist and spectrum faint.
15	M	4	F	+13·7	− 5·7	− 5·6	Star-line well seen.
April 10	M	2	F	+13·9	−37·5	−37·1	Spectrum very faint.
Dec. 15	M	4	F	− 4·5	−25·8	−29·4	Star-line well seen.
17	M	4	F	− 4·0	−15·2	−15·7	Star-line fairly well seen.
				Castor.			
Jan. 24	M	1	F	+ 5·1	+ 4·3	+ 7·6	Star-line very difficult to see.
Feb. 6	M	4	F	+ 9·0	+12·4	+10·5	Star-line very ill defined.
11	M	2	F	+10·4	+ 3·2	+10·0	
15	M	2	F	+11·5	+23·6	+31·5	Measures considered good.
Mar. 15	M	2	F	+16·8	− 1·3	− 3·7	Star-line difficult to besect.
				Procyon.			
Feb. 6	M	4	F	+ 7·3	+ 0·9	+ 1·5	
11	M	4	F	+ 8·7	+16·1	+28·0	Star-line very well seen.
12	N	2	F	+ 9·0	+37·5	+43·9	
15	M	2	F	+ 9·8	− 5·4	− 5·5	Spectrum steady.
Mar. 10	M	4	F	+14·9	−26·4	−25·4	Star-line very well defined.
15	M	4	F	+15·7	−33·3	−33·7	Definition good.
April 10	M	4	F	+17·5	+ 9·1	+ 4·3	Star-line very difficult to bisect.
Dec. 15	M	2	F	− 0·9	−12·6	−12·1	Star-line very difficult to hold steadily.
				Pollux.			
Feb. 6	M	2	F	+ 8·0	−38·5	−33·8	
11	M	2	F	+ 9·4	−38·1	−38·5	
15	M	4	F	+10·5	−62·2	−61·4	Star-line frequently seen well.
Mar. 15	M	2	F	+16·4	−36·8	−39·8	Star-line *very* faint.
24	M	2	b_1	+17·4	−50·1	−47·4	Star-line clearly seen.
				α Hydræ.			
Mar. 24	M	2	b_1	+10·7	+15·1	+19·3	Star-line very difficult to see.
				Regulus.			
Feb. 6	M	2	F	− 3·4	+ 6·0	+ 6·0	Star-line ill defined.
Mar. 15	M	2	F	+ 8·6	+20·0	+18·1	Star-line somewhat difficult to bisect.

Date. 1884.	Obs.	No. of Meas.	Line.	Earth's Motion in M. per sec.	Concluded Motion of Star. Meas.	Estimd.	Remarks.
April 10	M	2	F	+14·7	− 5·9	− 3·9	Star-line broad and ill defined.
12	N	2	F	+15·0	−19·4	−15·0	Spectrum somewhat faint.
28	M	2	F	+17·1	− 8·0	+ 2·2	Spectrum faint and rather unsteady.
May 13	N	2	F	+17·9	+ 5·7	+ 7·2	
30	M	2	F	+17·5	−11·9	− 9·3	Measures very difficult.
				γ′ Leonis.			
Mar. 24	M	2	b_1	+10·9	− 3·0	− 8·2	Star-line not well seen.
				β Leonis.			
April 10	M	2	F	+ 9·3	−37·3	−31·7	
28	M	2	F	+13·4	−53·4	−53·5	Spectrum unsteady and faint.
May 22	N	2	F	+16·7	−41·5	−42·2	Spectrum faint; star-line indistinct.
				ε Virginis.			
Mar. 24	M	2	b_1	− 1·1	+ 1·0	+ 1·1	Star-lines seen with great difficulty.
				Spica.			
April 5	N	1	F	− 1·8	−37·7	−38·8	Measure very difficult and rough.
May 30	M	2	F	+13·2	−15·8	−13·2	Spectrum very tremulous.
				Arcturus.			
Mar. 24	M	2	b_1	− 4·8	−53·0	−49·7	Star-lines seen very well.
April 5	N	2	F	− 1·6	−49·8	−49·1	Measures difficult.
12	N	3	F	+ 0·3	−55·1	−54·3	
28	M	2	F	+ 4·4	−38·9	−41·5	Star-line only seen by glimpses.
May 13	N	2	F	+ 8·0	−68·6	−73·0	
22	N	2	F	+ 9·8	−53·5	−59·3	
30	M	3	F	+11·3	−54·4	−55·1	
June 2	M	2	F	+11·8	−47·2	−44·6	Spectrum faint.
26	N	3	F	+14·6	−51·6	−55·7	
July 12	N	2	F	+15·3	−64·6	−64·1	Star-line very faint.
Aug. 5	M	2	F	+14·3	−52·9	−51·2	Measures difficult.
29	M	2	F	+11·1	−39·4	−47·4	Definition bad.
Sept. 25	M	2	b_1	+ 5·2	−53·5	−49·0	Star-lines seen with great difficulty.
				α Coronæ Borealis.			
April 28	M	2	F	− 0·3	+41·0	+44·8	Star-line not well seen.
May 22	N	2	F	+ 4·7	+16·3	+17·9	Star-line somewhat diffused.

Date. 1884.	Obs.	No. of Meas.	Line.	Earth's Motion in M. per sec.	Concluded Motion of Star. Meas.	Estimd.	Remarks.
June 2	M	2	F	+ 6·8	+ 7·2	+ 8·0	Star-line not well seen.
26	N	2	F	+10·4	+16·1	+17·3	Star-line diffused.
July 17	M	2	F	+12·3	−60·7	−54·4	Definition poor. Displacement evidently large towards the *blue*.
Aug. 5	M	2	F	+12·8	+23·8	+30·9	Definition fair, but spectrum faint.
Sept. 2	M	2	F	+11·2	−27·8	−19·8	Observations discordant.
					α Ophiuchi.		
June 26	N	4	F	+ 3·7	−29·8	−32·8	
July 17	M	2	F	+ 8·3	−14·2	−16·7	Star-line very ill defined.
Aug. 5	M	2	F	+11·6	−20·4	−19·8	Spectrum faint. Star-line diffused.
22	M	2	F	+13·6	−38·4	−36·4	Unmistakable displacement towards the *blue*.
23	N	2	F	+13·7	−36·0	−36·8	Spectrum faint.
Sept. 2	M	2	F	+14·4	−62·4	−55·3	Star-line seen distinctly.
					γ Draconis.		
Sept. 25	M	4	b_1	+ 4·7	−24·3	−32·9	Measures very difficult.
					Vega.		
May 13	N	2	F	− 6·5	−22·0	−21·4	
22	N	2	F	− 5·6	−21·0	−22·7	
June 26	N	2	F	− 1·2	−60·3	−58·8	Measures difficult.
July 12	N	2	F	+ 1·1	−36·1	−39·2	
17	M	2	F	+ 1·8	−41·3	−39·7	Spectrum bright.
19	M	2	F	+ 2·0	−38·5	−44·1	Star-line difficult to bisect.
30	N	2	F	+ 3·5	−49·4	−52·1	Star-line difficult to bisect.
Aug. 7	M	2	F	+ 4·5	−30·3	−41·9	Measures considered satisfactory.
19	M	2	F	+ 5·9	−34·8	−32·2	
21	N	2	F	+ 6·1	−38·0	−37·1	
22	M	2	F	+ 6·2	−33·7	−36·6	Definition good.
23	N	2	F	+ 6·3	−37·9	−40·3	
29	M	2	F	+ 6·9	−20·3	−25·1	Definition good.
Sept. 2	M	2	F	+ 7·2	−45·4	−39·5	Definition fair.
4	M	2	F	+ 7·4	−33·5	−32·7	Spectrum bright and steady.
10	M	2	F	+ 7·8	−33·3	−37·3	Definition poor.
12	M	2	F	+ 7·9	−25·4	−24·0	Definition good.
17	N	2	F	+ 8·2	−52·2	−50·9	
18	M	2	F	+ 8·2	−49·5	−40·3	Definition good.

Date. 1884.	No. Obs.	No. of Meas.	Line.	Earth's Motion in M. per sec.	Concluded Motion of Star. Meas.	Concluded Motion of Star. Estimd.	Remarks.
Oct. 22	M	2	F	+ 8·4	−23·9	−27·7	Measures considered good.
25	N	3	F	+ 8·3	−86·3	−86·6	Misty. Measures difficult.
Nov. 6	M	2	F	+ 7·6	−40·7	−31·0	Spectrum bright and steady.
7	N	2	F	+ 7·5	−32·0	−31·1	
				γ Lyræ.			
Aug. 19	M	2	F	+ 6·2	−42 2	−35·8	Spectrum faint.
Sept. 12	M	4	F	+ 9·0	−25 8	−30·9	Spectrum faint but steady.
				ζ Aquilæ.			
July 17	M	2	F	+ 1·9	−62·1	−43·9	Spectrum faint.
Aug. 19	M	2	F	+ 9·2	−11·8	−12·5	Spectrum faint.
Sept. 10	M	2	F	+12·7	−32 2	−27·4	Spectrum rather faint.
12	M	2	F	+13·0	−44·3	−43·8	Spectrum steady.
Oct. 22	M	2	F	+14·7	−49·2	−53·4	Spectrum very faint.
				δ Aquilæ.			
Sept. 12	M	4	F	+14·1	−14·2	−12·1	Star spectrum very faint; displacement practically nil.
				δ Cygni.			
Aug. 22	M	2	F	+ 2·1	−29·8	−27·9	Definition fair.
Sept. 12	M	2	F	+ 4·6	+28·2	+24·1	Definition good.
17	N	3	F	+ 5·1	−35·5	−35·7	Star-line somewhat diffused.
Oct. 22	M	2	F	+ 7·8	−43·1	−35·4	Star-line difficult to bisect.
				Altair.			
June 26	N	2	F	− 6·4	−36·7	−41·0	
July 17	M	2	F	− 1·1	−38·1	−34·0	Star-line fairly well seen.
19	M	2	F	− 0·7	−39·1	−34·4	Star-line difficult to bisect.
Aug. 5	M	2	F	+ 3·7	−39·8	−37·9	Measures considered good.
19	M	2	F	+ 7·2	−23·2	−23·6	Definition fair.
21	N	2	F	+ 7·6	−41·3	−37·4	
22	M	2	F	+ 7·9	−26·4	−26·2	Definition fair.
23	N	2	F	+ 8·1	−36·7	−36·5	
25	M	2	F	+ 8·5	−30·0	−27·4	Measures considered satisfactory.
29	M	2	F	+ 9·5	−48·8	−49·4	Spectrum faint.
Sept. 1	N	1	F	+10·1	−36·5	−39·8	Cloud passing; measure doubtful.
4	M	2	F	+10·7	−37·3	−35·3	Definition good.
12	M	2	F	+12·2	+ 9·8	+11·7	Definition poor.

Date. 1884.	Obs.	No. of Meas.	Line.	Earth's Motion in M. per sec.	Concluded Motion of Star. Meas.	Estimd.	Remarks.
Sept. 17	N	2	F	+13·1	−52·5	−54·7	
18	M	2	F	+13·2	−19·3	−16·4	Spectrum tremulous.
Oct. 22	M	2	F	+16·2	+ 0·7	+11·4	Star-line exceedingly ill defined.
25	N	2	F	+16·2	−46·6	−50·4	Star-line broad and diffused.
28	N	2	F	+16·2	−48·6	−45·3	
					γ Cygni.		
Sept. 27	M	2	b_1	+ 6·7	+ 5·9	+ 3·4	Definition bad.
Oct. 22	M	2	F	+ 9·3	−25·6	−31·4	Star-line very faint.
					α Delphini.		
Aug. 19	M	2	F	+ 3·0	−29·4	−27·6	Spectrum exceedingly faint.
22	M	2	F	+ 3·8	−40·0	−40·2	Marked displacement towards the blue.
Sept. 12	M	2	F	+ 8·7	+ 3·0	+ 3·6	Spectrum steady, but very faint.
18	M	2	F	+ 9·9	−50·6	−36·7	Star-line seen with great difficulty.
Oct. 22	M	2	F	+15·0	+46·8	+40·2	Measures considered fairly good.
					α Cygni.		
July 19	M	2	F	− 5·2	−35·3	−32·7	Star-line very faint.
21	M	2	F	− 5·0	−28·6	−32·9	Star-line seen with difficulty.
Sept. 12	M	2	F	+ 2·6	−35·3	−32·7	Star-line well defined.
17	N	3	F	+ 3·4	−41·8	−41·3	Star-line faint.
20	M	3	F	+ 3·8	−45·2	−42·3	Star-line fairly well defined.
25	M	2	b_1	+ 4·5	− 6·2	−13·8	Definition bad.
27	M	2	b_1	+ 4·8	−33·7	−36·9	Measures considered satisfactory.
Oct. 22	M	2	F	+ 7·7	−50·3	−53·7	Definition poor.
24	M	2	F	+ 7·9	−49·6	−30·7	Star-line seen with difficulty.
28	N	2	F	+ 8·3	−34·2	−34·2	
Nov. 6	M	2	F	+ 8·9	−43·4	−29·5	Star-line fairly well defined.
7	N	2	F	+ 9·0	−34·4	−34·2	Spectrum faint and unsteady.
					ε Cygni.		
Sept. 25	M	2	b_1	+ 7·2	−11·0	−20·5	Definition bad.
27	M	2	b_1	+ 7·5	− 2·8	+ 2·6	Spectrum unsteady.
Oct. 22	M	2	F	+10·9	+15·4	+22·2	Star-line very faint.
					α Cephei.		
July 17	M	1	F	− 6·2	−26·0	−21·8	Measure made with extreme difficulty.
Aug. 19	M	3	F	− 4·5	−30·7	−39·5	Star-line difficult to bisect.

Date. 1884.	Obs.	No. of Meas.	Line.	Earth's Motion in M. per sec.	Concluded Motion of Star. Meas.	Estimd.	Remarks.
Sept. 11	N	2	F	− 2·4	−57·0	−56·6	
12	M	2	F	− 2·3	−18·3	−18·3	Star-line difficult to bisect.
20	M	2	F	− 1·5	−40·0	−33·8	Star-line fairly well defined.
Oct. 22	M	2	F	+ 2·1	−29·9	−38·0	
Nov. 6	M	2	F	+ 3·7	−58·2	−36·5	Star-line faint.
				ϵ Pegasi.			
Sept. 20	M	2	F	+ 8·0	+17·2	+17·7	Definition fair.
25	M	4	b_1	+ 9·2	−17·9	−16·8	
27	M	2	b_1	+ 9·8	−29·0	−27·5	Measures very difficult.
Oct. 22	M	2	F	+14·9	−26·3	−25·9	Star spectrum and line faint.
				ζ Pegasi.			
Aug. 22	M	2	F	− 4·2	−11·7	−11·0	Measures very difficult.
Sept. 10	M	2	F	+ 1·2	−14·9	−18·0	Measures considered satisfactory.
12	M	2	F	+ 1·8	−34·3	−29·1	Definition fair.
20	M	2	F	+ 4·1	+ 2·0	+ 0·8	Measures very rough.
				Fomalhaut.			
Sept. 12	M	2	F	+ 5·3	+26·6	+25·5	Definition very bad.
				β Pegasi.			
Sept. 27	M	4	b_1	+ 2·1	+15·6	+16·5	Star-lines seen with great difficulty.
				α Pegasi.			
Aug. 5	M	2	F	−10·3	−24·0	−26·6	Measures considered rough.
12	N	2	F	− 8·7	+ 3·6	+ 5·2	Star-line broad and ill-defined.
22	M	2	F	− 6·2	−34·3	−30·2	Definition good.
23	N	2	F	− 6·0	−22·6	−22·4	Measures very difficult.
25	M	2	F	− 5·4	−17·1	−13·0	Definition poor.
Sept. 4	M	2	F	− 2·7	−18·3	−19·8	Definition fair.
10	M	2	F	− 1·0	−23·8	−23·5	Definition good.
12	M	2	F	− 0·4	+ 2·6	+ 4·5	Spectrum bright and steady.
17	N	2	F	+ 1·1	−38·8	−39·5	
18	M	2	F	+ 1·4	−57·8	−42·0	Spectrum faint.
20	M	4	F	+ 2·0	+ 3·6	+ 2·4	Definition poor.
Oct. 22	M	2	F	+10·8	−52·4	−51·2	Measures considered good.
24	M	2	F	+11·3	−45·0	−34·1	Star-line seen with difficulty.
28	N	2	F	+12·2	−44·4	−44·5	Spectrum faint; star-line indistinct.
Nov. 6	M	2	F	+14·1	−11·7	−14·1	Star-line fairly well defined.

Date.	Obs.	No. of Meas.	Line.	Motion Measured.	
				Moon.	
Feb. 2	N	1	F	+ 5·1	Moon in cloud.
6	M	5	F	− 2·3	Coincidence appeared perfect.
11	M	5	F	+ 2·0	
12	N	2	F	− 5·9	Coincidence appeared perfect.
29	N	2	F	− 8·2	Spectrum faint. Sky hazy.
Mar. 10	M	5	F	− 0·2	Lines appeared perfectly coincident.
12	M	2	F	− 2·7	Coincidence very satisfactory.
April 5	N	3	F	− 6·0	Coincidence appeared perfect.
10	M	5	F	+ 4·7	
12	N	2	F	− 2·3	Coincidence appeared perfect.
May 13	N	2	F	− 2·5	Coincidence appeared perfect.
30	M	5	F	− 1·2	Moon spectrum rather faint.
June 2	M	5	F	− 2·6	Moon spectrum rather faint.
July 12	N	2	F	− 4·1	Coincidence appeared perfect.
Aug. 5	M	5	F	− 1·8	Coincidence appeared perfect.
7	M	3	F	− 1·7	Coincidence appeared perfect.
11	M	5	F	+ 0·8	Coincidence appeared perfect.
12	N	2	F	− 9·1	Nearly coincident.
14	N	1	F	− 4·0	
Sept. 1	N	2	F	− 2·0	Coincidence appeared perfect.
2	M	5	F	− 1·4	No want of coincidence detected.
4	M	5	F	− 0·7	Coincidence appeared exact.
10	M	5	F	− 5·6	No want of coincidence detected.
11	N	4	F	− 0·7	Coincidence appeared perfect.
27	M	5	b_1	+ 8·9	Moon-lines very faint.
Oct. 28	N	2	F	− 6·1	Nearly coincident.
Nov. 7	N	4	F	− 1·0	
				Sky.	
Jan. 28	M	5	F	+ 1·9	Coincidence appeared perfect.
29	M	4	F	+ 3·0	No want of coincidence detected.
Feb. 16	M	5	F	+ 2·2	Coincidence appeared perfect.
June 27	N	2	F	− 5·9	Coincidence appeared perfect.
Aug. 22	N	2	F	− 4·9	Coincidence appeared perfect.
26	M	5	F	+ 2·8	
Sept. 19	M	5	F	− 0·3	No want of coincidence could be detected.
22	M	5	F	+ 0·1	
Nov. 7	M	5	F	− 2·2	No want of coincidence detected.

Date. 1884.	Obs.	No. of Meas.	Line	Earth's Motion in M per sec.	Concluded Motion of Star. Meas.	Estimd.	Remarks.
				Venus.			
Feb. 21	M	2	F		−23·2	−33·6	Measures not considered satisfactory. Computed motion −6·4
29	N	2	F		−49 5	−45·7	Sky hazy. Computed motion −6·8.
Mar. 24	M	4	b_1		−43·2	−34·1	Displacement clearly towards the *blue*. Computed motion −7·6.
				Mars.			
Mar. 15	M	2	F		+17·3	+13·4	Computed motion +8·1.
24	M	2	b_1		+12·6	+20·5	Spectrum bright and steady; lines well seen. Computed motion +8·8.
				Orion Nebula.			
Feb. 15	M	4	F	+15·0	−33·5	−31·0	Measures merely experimental.
18	M	4	F	+15·3	−51·5		No estimations made. Measures most difficult.
				Rotation of Jupiter.			
				Displacement between the *p* and *f* limbs.			
Feb. 6	M	5	F		+33·5		F line in Jupiter not well seen. Slit $0^{in}·0018 = 1''·8$. The slit was placed as nearly on the limb as practicable.
Mar. 24	M	4	b_1		+16·4		Spectrum faint and lines indistinct. Slit $0^{in}·0015 = 1''·5$. The point observed was about 2″ from the limb.

Computed relative motion of the limbs 30·9 miles per second, the equatorial diameter of *Jupiter* being taken as 88,000 miles, and its period of rotation as $9^h\ 56^m$.

Note on the Nautical Almanac Dimensions of the Saturnian System. By Capt. W. Noble.

For many years I have been in the habit of cutting out stencil plates of latten brass to facilitate the sketching of the various planets by thus previously preparing their outlines. I have been recently struck, however, with the discrepancy between the observed proportions of the system of *Saturn* and his rings as seen in the telescope and those derived from diagrams carefully prepared from the data given in the *Nautical Almanac*. To illustrate what I mean I subjoin two sketches, one made at the

telescope on Saturday night last (March 7), the other drawn accurately from the *Nautical Almanac* data. It will be seen at a glance that the latter drawing shows the ball of the planet notably smaller than it appears in the telescope. The most striking illustration of this is seen in the case of the interval between Cassini's division and the south pole of the planet. In reality *Saturn's* south pole just touches this division. In the diagram laid down to scale a very notable gap exists between them. What is wrong in the data I leave others to determine.

Forest Lodge, Maresfield, Uckfield:
1885, *March* 12.

Report of the Royal Observatory, Edinburgh.

Appendix.—Since the publication of the Annual Report, the Government have authorised the Astronomer Royal for Scotland to proceed forthwith in the printing of the Edinburgh Star Catalogue. All the remaining MSS. have therefore been sent to Messrs. Neill & Co. for printing, and it is confidently expected that within the next two years this important Star Catalogue will be in the hands of astronomers.

Note on the Transit of Jupiter's Satellite IV., seen at Clapham, 1885, *February* 27. By Edmund J. Spitta.

The transit of Satellite IV. was observed here both with the 10-inch Calver Reflector and the $3\frac{1}{8}$-inch Tully Refractor, as well as the continual interruption from clouds would permit. Actual ingress was not seen, but at 9.45, during a wave of fine definition and entire absence of cumuli, the satellite appeared in transit perfectly black and round, projected on the edge of a large white spot without the confines of the neighbouring belt, which spot preceded the satellite. At 10.20, during another fair time, the satellite was seen again, intensely black but decidedly oval, with the longer axis parallel to the belts. The Refractor did not show the blackness as well as the Reflector, but possibly the difference in aperture was sufficient to account for this. On using the occulting eyepiece no perceptible change in the blackness or position of the longer axis was noticeable, and clouds prevented verifying the oval appearance in the Refractor. The Reflector was used on the west side of the polar axis, and the Refractor was a zodiacal Equatorial.

Phenomena of Jupiter's Satellites, and Occultations of Stars by the Moon, observed at Stonyhurst, 1884.
By the Rev. S. J. Perry.

	Sat.	Phenomena.	G.M.T.	Corr. of N.A.	Observer.	Remarks.
			h m s	m s		
1884, Jan. 20	2	Oc. R. First seen	8 35 19·9		S. J. P.	Fair.
		Bisection	36 25·7			
		External contact	39 15·0			
31	1	Tr. E. Internal contact	10 50 11·0		W. C.	Planet very tremulous.
		Bisection	52 21·0			
		External contact	54 51·3			
Feb. 2	3	Oc. D. External contact	10 55 21·4		J. R.	Good.
		Bisection	59 47·9			
		Last seen	11 3 23·4			
22	1	Oc. D. External contact	10 54 8·7		W. C.	Fair.
		Bisection	55 23·2			
		Last seen	56 41·2			
24	1	Ec. R. First seen	8 28 57·1	−0 12·9	W. C.	Good.
		Half light	30 9·6			
		Full light	31 32·6			
Mar. 15	2	Tr. E. Internal contact	7 58 37·3		S. J. P.	Thin clouds passing.
		Bisection	8 1 33·5			
		External contact	3 17·0			
16	1	Oc. D. External contact	10 46 11·6		W. C.	Planet very unsteady.
		Bisection	48 6·6			

	Sat.	Phenomena.	M.T. h m s	Corr. of N.A. m s	Observer.	Remarks.
1884, Mar. 16		Last seen	49 58·5			
	3	Oc. R. First seen	11 15 25·0		W. C.	Somewhat unsteady.
		Bisection	17 15·5			
		External contact	19 23·5			
	3	Ec. D. Fading	12 20 12·5		W. C.	Good.
		Half light	23 19·0			
		Last seen	26 26·5	+2 19·5		
	1	Ec. R. First seen	14 15 10·2	+0 29·2	W. C.	Hazy.
		Half light	16 26·0			
		Full light	17 35·5			
21	4	Ec. R. First seen	8 18 12·5	−4 6·5	W. C.	Very good.
		Half light	21 45·0			
		Full light	25 41·0			
23	1	Oc. D. External contact	12 38 50·3		W. C.	Very good.
		Bisection	39 45·4			Satellite smaller than usual.
		Last seen	41 38·3			
Ap. 7	2	Oc. D. External contact	7 41 51·1		W. C.	Fair.
		Bisection	43 25·6			
		Last seen	45 4·4			
9	1	Tr. I. External contact	8 14 17·3		S. J. P.	Very unsteady.
		Bisection	16 43 1			
		Internal contact	18 38 4			

		Sat.	Phenomena.	G.M.T. h m s	Corr. of N.A. m s	Observer.	Remarks.
1884, Ap	9	1	Tr. E. Internal contact	10 31 23·1		W. C.	Very unsteady.
			Bisection	33 53·6			
			External contact	35 40·1			
	10	3	Tr. I. External contact	9 10 6·9		W. C.	Hazy.
			Bisection	14 27·7			
			Internal contact	18 38·2			
	17	1	Ec. R. First seen	10 54 42·8	+0 37·8	J. R.	Very good.
			Half light	56 44·8			
			Full light	58 21·8			
May	18	1	Tr. E. Internal contact	9 11 53·2		W. C.	Unsteady.
			Bisection	13 54·7			
			External contact	16 17·2			
	26	1	Ec. R. First seen	9 29 48·4	+0 46·4	W. C.	Rather hazy.
			Half light	30 43·9			
			Full light	31 26·4			
Nov.	9	1	Tr. E. Internal contact	16 34 19·7		W. C.	Fair.
			Bisection	35 52·7			
			External contact	37 34·2			
	10	4	Ec. D. Half light	16 12 17·2		W. C.	Thin clouds passing.
			Last seen	14 20 6	+1 2·6		

The 8-inch Equatorial was used throughout, the observers being the Rev. S. J. Perry, and Messrs. W. Carlisle and J. Rooney.

Occultations of Stars by the Moon.

	Star.	Phen.	G.M.T. h m s	Limb.	Obs.	Remarks.
1883.						
Mar. 12	*o* Arietis	D.	6 45 19·7	Dark	W.C.	Observation very good.
		R.	7 46 4·6	Bright	,,	,,
1884.						
Mar. 11	*ν* Leonis	D.	9 23 53·4	Bright	,,	Hazy.
		R.	10 21 1·7	,,	,,	Very good.
Oct. 9	130 Tauri	R.	10 39 12·0	Dark	,,	,,
12	60 Cancri	D.	16 54 52·0	Bright	,,	,,
		R.	17 35 1·3	Dark	,,	,,
	a Cancri	D.	18 0 53·1	Bright	,,	Good.
		R.	18 57 3·9	Dark	,,	Difficult. Twilight.
Nov. 9	*h* Leonis	D.	13 59 55·8	Bright	,,	Very good.
		R.	15 4 9·1	Dark	,,	,,

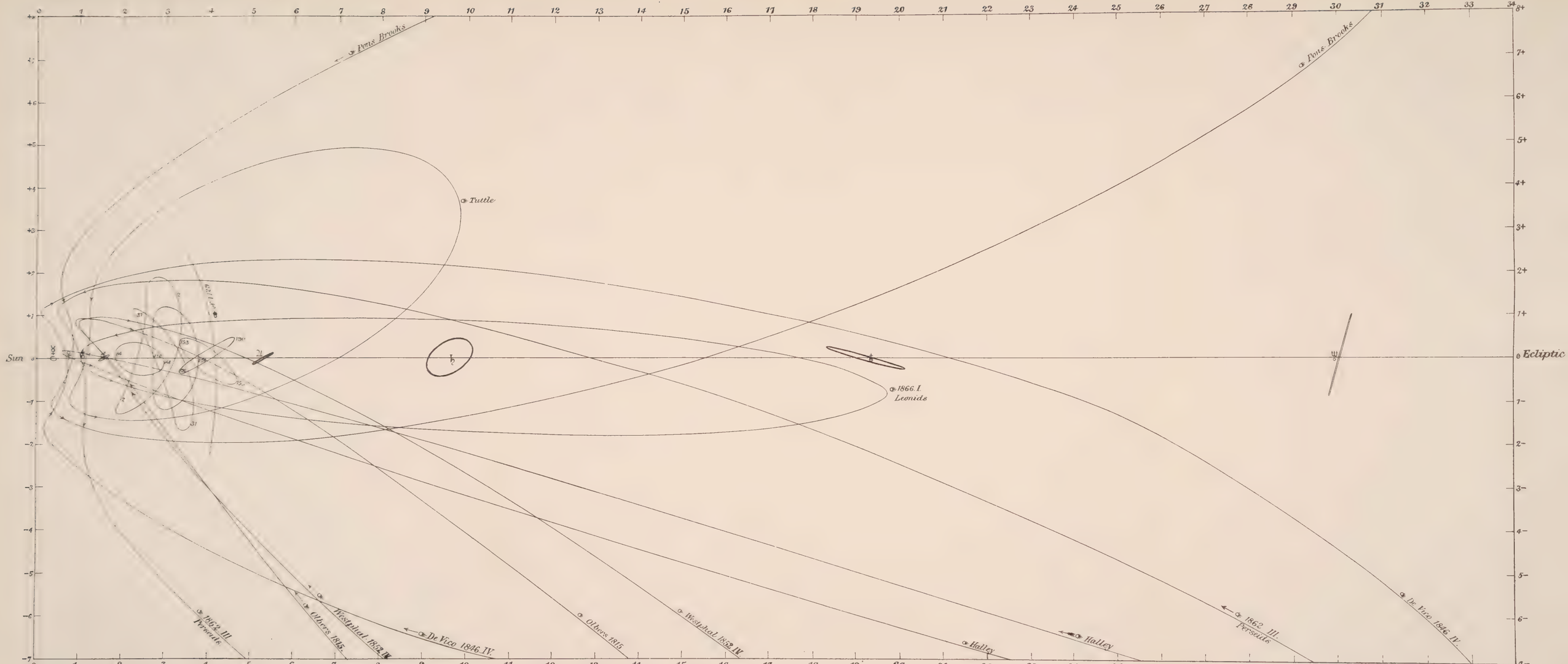
Data for a Graphical Representation of the Solar System.

By A. Marth.

The recognition of the chief peculiarities of the orbits of comets and planets, of some of their mutual relations, and especially of their proximities, may be considerably aided by a proper graphical representation. The method of representation, which I have employed in special cases for a long time past, appears to me so serviceable and instructive, that I have thought it worth the trouble to apply it to a great number of orbits, and as some recent publications* seem to show that the method is not known, it will probably be of real service to others if I publish the data, which will enable them to prepare such an instructive representation on an adequate scale for themselves.

The principle of the method employed is very simple. The Sun's centre being the common focus of all the orbits, a plane passing through the Sun's centre perpendicular to the ecliptic will intersect all the orbits. Let this plane rotate, and let, for each orbit, the tracing be represented which the point of intersection produces on the plane in the course of a full rotation, and which, for the present purpose, may perhaps be called the "ecliptical intersect" of the orbit. The form or shape of the tracing or intersect depends on the elements, i, e, ω, of the orbit: i, the inclination to the ecliptic; e, the eccentricity; and ω, the angular distance or departure of the perihelion from the

* *Vide* the dissertation of Andreas Galle, *Zur Berechnung der Proximitäten der Asteroiden-Bahnen*, Breslau, 1883, and the review of it, by Fr. Deichmüller in the *Vierteljahrsschrift der Astron. Gesellschaft*, vol. xix, pp. 214–225.



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ascending node ☊. A circular orbit in the plane of the ecliptic would accordingly be represented by a point or dot, an eccentric orbit in the same plane by a line or dash, a circular orbit inclined to the ecliptic by a circular arc, an eccentric orbit in which ω is $= \pm 90^\circ$ by an arc of another curve. In order to lay down the "ecliptical intersect" of any actual orbit the co-ordinates of a sufficient number of points must be known, through which the curve may be easily drawn by hand. The co-ordinates required are the curtate distances from the Sun and the distances from the plane of the ecliptic, or $r \cos b$ and $r \sin b$, if r denotes the radius-vector and b the latitude, to which must be added the corresponding ecliptical longitudes l and also the true anomalies v. In the present paper I furnish these data for 150 of the minor planets; in a continuation I will communicate similar data for the periodical and a number of other comets. If the graphical representation is intended to serve in the investigations of close proximities, it must be made on an adequate scale, say of 5 inches for the distance 1, and if it is intended to serve in the investigations of such questions as those suggested by the non-appearance of Biela's or De Vico's comet of short period, it must be extended to all the minor planets, and can therefore only be accomplished by being spread over a series of sheets. As the greatest distance from the plane of the ecliptic, which any planet can reach, is

$+1{\cdot}896$ in the case of *Pallas*,

and $-1{\cdot}671$ in the case of *Euphrosyne*,

the width of the sheets need not extend much beyond these limits; for the parts of cometary orbits outside of these limits will better be represented specially on a smaller scale. This smaller scale will also be sufficient for all the orbits or parts of orbits beyond that of *Saturn*.

The rectangular co-ordinates $r \cos b = x$, and $r \sin b = z$ being reckoned from the Sun's centre, the Sun's surface is to be represented by a circle or semicircle of radius ·0047, the intersect of the Earth by a line extending from 0·9832 to 1·0168 of the x axis, which represents the plane of the ecliptic. The co-ordinates of the points of the ecliptical intersects of *Mercury*, *Venus*, *Mars*, and *Jupiter*, which correspond to the ecliptical longitudes l, are:

	Mercury.		*Venus.*		*Mars.*		*Jupiter.*	
l	$r \cos b$	$r \sin b$	$r \cos b$	$r \sin b$	$r \cos b$	$r \sin b$	$r \cos b$	$r \sin b$
°	0·3515	−0·0315	0·7253	−0·0417	1·393	·034	4·955	−0·112
30	·3240	−0·0116	·7235	·0307	1·436	−0·015	4·958	·106
60	·3093	+0·0086	·7215	−0·0115	1·501	+0·010	5·022	·072
90	·3081	·0259	·7194	+0·0106	1·575	·034	5·132	−0·018

	Mercury.		*Venus.*		*Mars.*		*Jupiter.*	
l	$r\cos b$	$r\sin b$	$r\cos b$	$r\sin b$	$r\cos b$	$r\sin b$	$r\cos b$	$r\sin b$
120°	0·3211	0·0377	0·7179	0·0298	1·637	0·050	5·263	+0·043
150	·3487	·0417	·7175	·0410	1·665	·053	5·379	·096
180	·3889	·0349	·7190	·0413	1·648	·040	5·447	·123
210	·4326	+0·0155	·7218	·0306	1·593	+0·016	5·443	·116
240	·4622	−0·0129	·7249	+0·0116	1·520	−0·010	5·370	·077
270	·4591	·0385	·7270	−0·0107	1·450	·031	5·250	+0·024
300	·4314	·0507	·7276	·0302	1·401	·043	5·119	−0·042
330	·3898	·0466	·7268	·0415	1·381	·044	5·013	·089
0	0·3515	−0·0315	0·7253	−0·0417	1·393	−0·034	4·955	−0·112

For the minor planets and comets the values of l, $r\cos b$ and $r\sin b$ are given which correspond to the true anomalies v. The 150 minor planets in the list are (1) to (138), with the exception of (99), (131), and (132), which have been observed in a single apparition only, and the following 15 : (143), (147), (148), (153), (154), (158), (164), (173), (176), (179), (181), (185), (186), (190), and (207). Of these (66), (104), (125), (137), (147), (153), (176), (186), (190), and (207) have been observed in four apparitions, and (164) *Eva*—which is of special interest, as it reaches the smallest curtate distance of all—in only three ; all the others have been observed in at least five apparitions. Though for a number of the minor planets I have supplanted my older computations so that the data may be founded upon the latest elements of the orbits, I have not considered it necessary to do so throughout. The data for (41), (43), (71), (76), (80), depend on the elements published in the *Berlin. Astron. Jahrbuch* for 1885, those for (5), (6), (10), (11), (14), (16), (17), (19), (25), (28), (30), (33), (87), (107), (122), (153) in the *Jahrbuch* for 1884, those for (31) in that for 1880. The data of (1) to (4) are founded upon the elements given in the *Nautical Almanac* for 1885 ; all the others upon those given in the *Berlin. Jahrbuch* for 1886. The longitudes l are all reckoned from the point of the equinox of 1880·0. The magnitudes attached to the names of the planets are the values of g in the Berlin list of elements, and furnish some plausible indication of the relative size of the minor planets. If Δ is the distance of the planet from the Earth and r its distance from the Sun, the apparent magnitude of the planet will be approximately $= g + 5\ (\log\Delta + \log r)$.

	(1) *Ceres* 4m·0.			(4) *Vesta* 4m·0.			(5) *Astræa* 6m·9.		
	l	$r\cos b$	$r\sin b$	l	$r\cos b$	$r\sin b$	l	$r\cos b$	$r\sin b$
°	°			°			°		
0	147·62	2·509	+0·432	251·97	2·147	+0·140	134·68	2·090	−0·023
30	178·10	2·528	·470	281·79	2·175	+0·008	164·56	2·134	+0·078
60	208·45	2·615	·388	311·59	2·239	−0·132	194·53	2·264	·169
90	238·33	2·742	+0·196	341·57	2 330	·248	224 62	2·474	·229
120	267·85	2·862	−0·066	11·76	2·433	·305	254·74	2·734	·234
150	297·50	2·934	·329	41·96	2·523	·278	284·77	2·967	·165
180	327·62	2·943	·507	71·97	2·565	·168	314·68	3·064	+0·034
210	358·10	2·903	·540	101·79	2·538	−0·009	344·56	2·969	−0·109
240	28·45	2·832	·420	131·59	2·447	+0·145	14·53	2·737	·204
270	58·33	2·742	−0·196	161·57	2·330	·248	44·62	2·474	·229
300	87·85	2·643	+0·061	191·76	2·226	·279	74·74	2·262	·194
330	117·50	2·556	·287	221·96	2·162	·238	104·77	2·132	·119
0	147·62	2·509	+0·432	251·97	2·147	+0·140	134·68	2·090	−0·023

	(2) *Pallas* 4m·5.			(3) *Juno* 5m·5.			(6) *Hebe* 5m·8.		
0	127·70	1·931	−0·946	54·76	1·943	−0·405	14·56	1·890	−0·413
15	142·24	2·042	0·717	70·07	1·945	·443	29·87	1·887	·472
30	155·54	2·163	0·442	35·46	1·989	·459	45·34	1·914	·505
45	168·10	2·276	−0·126	100·82	2·063	·448	60·84	1·970	·509
60	180·45	2·371	+0·222	116·04	2·172	·410	76·24	2·057	·482
75	193·15	2·441	0·592	131·07	2·314	·341	91·41	2·170	·421
90	206·73	2·488	0·966	145·91	2·482	·240	106·33	2·304	·326
105	221·65	2·522	1·319	160·60	2·668	−0·107	121·02	2·447	·196
120	238·14	2·566	1·619	175·22	2·859	+0·053	135·56	2·588	−0 037
135	255·91	2·650	1·824	189·87	3·036	·232	150·07	2·712	+0·141
150	274·11	2·790	1·896	204·64	3·178	·412	164·68	2·803	·324
165	291·61	2·974	1·805	219·60	3·276	·572	179·50	2·850	·492
180	307·70	3·158	1·548	234·76	3·281	·684	194·56	2·850	·623
195	322·24	3·282	1·153	250·07	3·243	·738	209·87	2·806	·701
210	335·54	3·305	0·675	265·46	3·122	·720	225·34	2·728	·719
225	348·10	3·212	+0·178	280·82	2·976	·646	240·84	2·629	·679
240	0·45	3·021	−0·283	296·04	2·810	·530	256·24	2·520	·590
255	13·15	2·766	0·671	311·07	2·642	·389	271·41	2·410	·468
270	26·73	2·488	0·966	325·91	2·482	·240	286·33	2·304	·326
285	41·65	2·226	1·164	340·60	2·337	+0·094	301·02	2·203	·176
300	58·14	2·014	1·270	355·22	2·210	−0·041	315·56	2·112	+0·030
315	75·91	1·878	1·293	9·87	2·105	·161	330·07	2·032	−0·106
330	94·11	1·826	1·241	24·64	2·024	·262	344·68	1·966	·228
345	111·61	1·850	1·123	39·60	1·965	·343	359·50	1·917	·331
0	127·70	1·931	−0·946	54·76	1·943	−0·405	14·56	1·890	−0·413

	(8) *Flora* 6^{m}·8.			(9) *Metis* 6^{m}·3.			(10) *Hygieia* 5^{m}·4.		
v	l	$r\cos b$	$r\sin b$	l	$r\cos b$	$r\sin b$	l	$r\cos b$	$r\sin b$
°	°			°			°		
0	33·42	1·846	−0·186	71·35	2·092	+0·009	237·09	2·771	−0·138
30	63·64	1·878	·142	101·24	2·121	·111	267·07	2·806	−0·060
60	93·44	1·990	−0·061	131·25	2·206	·192	297·00	2·925	+0·038
90	123·29	2·147	+0·048	161·38	2·339	·229	326·97	3·092	·136
120	153·20	2·324	·162	191·49	2·496	·206	356·99	3·277	·207
150	183·27	2·473	·243	221·48	2·629	+0·118	27·05	3·432	·224
180	213·42	2·534	·255	251·35	2·681	−0·012	57·09	3·495	·174
210	243·64	2·472	·188	281·24	2·628	·138	87·07	3·438	+0·073
240	273·44	2·329	+0·071	311·25	2·495	·217	117·00	3·284	−0·043
270	303·29	2·147	−0·048	341·38	2·339	·229	146·97	3·092	·136
300	333·20	1·986	·138	11·49	2·206	·182	176·99	2·919	·184
330	3·27	1·879	·185	41·48	2·121	−0·096	207·05	2·800	·183
0	33·42	1·846	−0·186	71·35	2·092	+0·099	237·09	2·771	−0·138
	(7) *Iris* 5^{m}·8.			(12) *Victoria* 7^{m}·2.			(13) *Egeria* 6^{m}·7.		
0	41·94	1·832	+0·109	301·91	1·807	+0·243	120·04	2·260	+0·652
15	56·90	1·846	·070	317·05	1·815	·264	135·67	2·261	·671
30	71·85	1·882	+0·026	332·21	1·848	·271	151·27	2·288	·647
45	86·78	1·942	−0·021	347·35	1·906	·262	166·68	2·337	·582
60	101·72	2·024	·071	2·44	1·989	·236	181·79	2·404	·476
75	116·68	2·128	·121	17·44	2·094	·193	196·57	2·478	·335
90	131·68	2·253	·169	32·37	2·218	·131	211·11	2·552	+0·164
105	146·71	2·393	·210	47·24	2·355	+0·053	225·50	2·616	−0·026
120	161·77	2·542	·241	62·08	2·495	−0·039	239·92	2·664	·222
135	176·84	2·688	·256	76·94	2·626	·138	254·51	2·694	·411
150	191·90	2·812	·250	91·85	2·732	·236	269·38	2·705	·576
165	206·94	2·899	·222	106·84	2·800	·320	284·57	2·702	·702
180	221·94	2·932	·174	121·91	2·820	·379	300·04	2·691	·777
195	236·90	2·905	·110	137·05	2·789	·406	315·67	2·676	·794
210	251·85	2·823	−0·039	152·21	2·713	·398	331·27	2·661	·753
225	266·78	2·700	+0·030	167·35	2·605	·358	346·68	2·644	·658
240	281·72	2·552	·090	182·44	2·478	·294	1·79	2·622	·519
255	296·68	2·399	·136	197·44	2·346	·216	16·57	2·593	·350
270	311·68	2·253	·169	212·37	2·218	·131	31·11	2·552	−0·164
285	326·71	2·124	·186	227·24	2·103	−0·048	45·50	2·500	+0·024
300	341·77	2·016	·191	242·08	2·003	+0·031	59·92	2·442	·204
315	356·84	1·933	·184	256·94	1·922	·101	74·51	2·381	·363
330	11·90	1·883	·167	271·85	1·861	·160	89·38	2·326	·495
345	26·94	1·842	·141	286·84	1·823	·208	104·57	2·283	·593
0	41·94	1·832	+0·109	301·91	1·807	+0·243	120·04	2·260	+0·652

v	(11) *Parthenope* 6m·5. l	r cos b	r sin b	(14) *Irene* 6m·6. l	r cos b	r sin b	(15) *Eunomia* 5m·4. l	r cos b	r sin b
°	°			°			°		
0	318·14	2·212	−0·040	179·42	2·141	+0·344	28·31	2·104	+0·436
30	348·09	2·236	·123	209·72	2·190	·296	58·79	2·164	·370
60	18·13	2·309	·178	239·69	2·326	+0·170	88·70	2·323	+0·208
90	48·22	2·422	·191	269·36	2·521	−0·018	118·14	2·551	−0·036
120	78·27	2·551	·151	299·06	2·734	·235	147·67	2·796	·320
150	108·23	2·656	−0·063	329·09	2·905	·414	177·75	2·993	·557
180	138·14	2·695	+0·049	359·42	2·972	·477	208·31	3·073	·637
210	168·09	2·652	·146	29·72	2·908	·392	238·79	3·001	·514
240	198·13	2·548	·197	59·69	2·737	−0·200	268·70	2·803	−0·251
270	228·22	2·422	·191	89·36	2·521	+0·018	298·14	2·551	+0·036
300	258·27	2·312	·136	119·06	2·323	·200	327·67	2·317	·265
330	288·23	2·238	+0·053	149·09	2·188	·312	357·75	2·158	·401
0	318·14	2·212	−0·040	179·42	2·141	+0·344	28·31	2·104	+0·436
	(16) *Psyche* 5m·9.			(17) *Thetis* 7m·3.			(19) *Fortuna* 7m·1.		
0	13·84	2·513	−0·092	262·37	2·152	+0·144	30·81	2·056	+0·000
30	43·86	2·553	·131	292·29	2·188	+0·048	60·80	2·094	−0·028
60	73·90	2·674	·140	322·15	2·285	−0·065	90·80	2·206	·051
90	103·92	2·861	·112	352·09	2·433	·174	120·81	2·380	·064
120	133·90	3·077	−0·047	22·17	2·590	·243	150·82	2·585	·061
150	163·86	3·254	+0·040	52·31	2·728	·256	180·82	2·759	·038
180	193·84	3·323	·122	82·37	2·788	·186	210·81	2·829	−0·001
210	223·86	3·251	·167	112·29	2·739	−0·060	240·80	2·759	+0·037
240	253·90	3·073	·160	142·15	2·600	+0·074	270·80	2·585	·060
270	283·92	2·861	·112	172·09	2·433	·174	300·81	2·380	·064
300	313·90	2·678	+0·041	202·17	2·276	·218	330·82	2·206	·052
330	343·86	2·556	−0·032	232·31	2·179	·204	0·82	2·094	·029
0	13·84	2·513	−0·092	262·37	2·152	+0·144	30·81	2·056	+0·000
	(20) *Massalia* 6m·5.			(21) *Lutetia* 7m·4.			(24) *Themis* 6m·7.		
0	100·06	2·062	−0·024	327·41	2·038	−0·101	144·02	2·728	+0·036
30	130·06	2·097	·023	357·44	2·077	·111	174·02	2·770	·026
60	160·06	2·200	·019	27·48	2·192	·095	204·02	2·893	+0 008
90	190·06	2·359	−0·008	57·47	2·371	−0·051	234·02	3·080	−0·014
120	220·06	2·541	+0·007	87·43	2·581	+0·016	264·02	3·292	·035
150	250·06	2·694	·022	117·40	2·757	·089	294·02	3·467	·048
180	280·06	2·754	·032	147·41	2·827	·140	324·02	3·536	·047
210	310·06	2·694	·031	177·44	2·755	·148	354·02	3·467	·032
240	340·06	2·541	·022	207·48	2·578	·112	24·02	3·292	−0·009
270	10·06	2·359	+0·008	237·47	2·371	+0·051	54·02	3·080	+0·014
300	40 06	2·200	−0·006	267·43	2·194	−0·014	84·02	2·893	·030
330	70·06	2·097	·017	297·40	2·078	·067	114·02	2·770	·038
0	100·06	2·062	−0·024	327·41	2·038	−0·101	144·02	2·728	+0·036

	(18) *Melpomene* 6m·9.			(22) *Kalliope* 6m·1.			(23) *Thalia* 7m·3.		
v	*l*	*r* cos *b*	*r* sin *b*	*l*	*r* cos *b*	*r* sin *b*	*l*	*r* cos *b*	*r* sin *b*
°	°			°			°		
0	15·00	1·782	−0·224	58·61	2·605	−0·088	122·84	1·998	+0·296
15	30·13	1·786	·276	73·19	2·613	+0·074	137·98	2·004	·341
30	45·23	1·817	·314	87·81	2·629	·233	153·20	2·039	·367
45	60·46	1·865	·334	102·59	2·652	·382	168·44	2·105	·373
60	75·68	1·943	·336	117·57	2·688	·511	183·63	2·201	·357
75	90·85	2·046	·316	132·77	2·733	·612	198·72	2·326	·317
90	105·91	2·170	·272	148·14	2·796	·676	213·70	2 476	·250
105	120·85	2·308	·204	163·58	2·872	·697	228·56	2·642	·157
120	135·68	2·451	−0·112	178·96	2·959	·669	243·34	2·814	+0·039
135	150·46	2·585	·000	194·18	3 047	·590	258·11	2·974	−0·097
150	165·23	2·692	+0·123	209·19	3·126	·464	272·91	3·104	·238
165	180·07	2·758	·244	223·98	3·183	·299	287·82	3·185	·370
180	195·00	2·773	·349	238·61	3·207	+0·108	302 84	3·204	·474
195	210·13	2·737	·423	253·19	3·195	−0·091	317·98	3·161	·537
210	225·23	2·655	·459	267·81	3·148	·279	333·20	3·064	·551
225	240·46	2·544	·456	282·59	3·072	·442	348·44	2·930	·520
240	255·68	2·418	·418	297·57	2·980	·567	3·63	2·778	·451
255	270·85	2·290	·354	312·77	2·884	·646	18·72	2·623	·357
270	285·91	2·170	·272	328·14	2·796	·676	33·70	2·476	·250
285	300·85	2·062	·182	343·58	2·722	·661	48·56	2·343	·139
300	315·68	1·970	+0·090	358·96	2·667	·603	63·34	2·230	−0·031
315	330·46	1·895	·000	14·18	2·631	·509	78·11	2·137	+0·069
330	345·23	1·842	−0·084	29·19	2·611	·387	92·91	2 066	·159
345	0·07	1·800	·159	43·98	2·603	·244	107·82	2·019	·235
0	15·00	1·782	−0·224	58·61	2·605	−0·088	122·84	1·998	+0·296

	(26) *Proserpina* 7m·3.			(27) *Euterpe* 7m·2.			(29) *Amphitrite* 6m·1.		
0	236·77	2·424	−0·028	88·13	1·938	−0·005	56·38	2·354	+0 218
30	266·73	2·448	·100	118·12	1·978	+0·022	86·52	2·373	·254
60	296·75	2·521	·149	148·12	2·093	·047	116·66	2·439	·227
90	326·81	2·631	·163	178·13	2·275	·063	146·67	2·537	·137
120	356·85	2·753	·131	208·14	2·492	·063	176·53	2·638	+0·001
150	26·83	2·851	−0·060	238·14	2·680	·044	206·38	2·711	−0·143
180	56·77	2·888	+0·033	268·13	2·756	+0·008	236·38	2·732	·253
210	86·73	2·849	·116	298·12	2·680	−0·030	266·52	2·700	·289
240	116·75	2·751	·163	328·12	2·493	·056	296·66	2·627	·244
270	146·81	2·631	·163	358·13	2·275	·063	326·67	2·537	·137
300	176·85	2·523	·120	28·14	2·093	·053	356·53	2·450	−0·001
330	206·83	2·450	+0·051	58·14	1·977	·032	26·38	2·384	+0·126
0	236·77	2·424	−0·028	88·13	1·938	−0·005	56·38	2·354	+0·218

	(25) *Phocæa* 7m·9.			(28) *Bellona* 6m·6.			(31) *Euphrosyne* 6m·8.		
v	l	r cos b	r sin b	l	r cos b	r sin b	l	r cos b	r sin b
°	°			°			°		
0	302·55	1·660	+0·657	124·15	2·361	−0·136	90·50	2·251	+0·960
15	318·64	1·679	0·643	138·97	2·375	−0·039	106·74	2·218	1·068
30	334·44	1·737	0·594	153·78	2·406	+0·063	123·43	2·245	1·118
45	349·74	1·830	0·507	168·61	2·453	·164	140·06	2·337	1·104
60	4·49	1·951	0·382	183·52	2·515	·260	156·13	2·491	1·022
75	18·76	2·091	0·220	198·53	2·593	·345	171·38	2·693	0·866
90	32·77	2·242	+0·022	213·64	2·686	·413	185·80	2 917	0·633
105	46·75	2·392	−0·206	228·82	2·789	·457	199·59	3·158	+0·327
120	60·95	2·531	0·451	244·02	2·898	·471	213·06	3·367	−0·043
135	75·59	2·648	0·693	259·19	3·004	·450	226·57	3·523	0·454
150	90·77	2·734	0·903	274·28	3·095	·393	240·47	3·605	0·868
165	106·49	2·786	1·050	289·26	3·160	·301	255·06	3 607	1·236
180	122·55	2·801	1·108	304·15	3·188	·184	270·50	3·541	1·511
195	138·64	2·780	1·065	318·97	3·174	+0·052	286·74	3·435	1·654
210	154·44	2·725	0·931	333·78	3·119	−0·082	303·43	3·319	1·652
225	169·74	2·637	0·731	348·61	3·030	·203	320·06	3·212	1·517
240	184·49	2·523	0·494	3·52	2·920	·302	336·13	3·115	1·278
255	198·76	2·388	0·251	18·53	2·802	·373	351·38	3·023	0·972
270	212·77	2·242	−0·022	33·64	2·686	·413	5·80	2·917	0·633
285	226·75	2·095	+0·180	48·82	2·582	·423	19·59	2·814	−0·291
300	240·95	1·957	0 349	64·02	2·496	·406	33·06	2·692	+0·035
315	255·59	1·837	0·481	79·19	2·431	·364	46·57	2·564	0·330
330	270·77	1·743	0·576	94·28	2·388	·303	60·47	2·438	0·587
345	286·49	1·682	0·634	109·26	2·365	·226	75·06	2·329	0·798
0	302·55	1 660	+0·657	124·15	2·361	−0·136	90·50	2·251	+0·960

	(30) *Urania* 7m·4.			(32) *Pomona* 7m·5.			(34) *Circe* 8m·2.		
0	31·61	2·053	+0·075	193·82	2·370	−0·104	150·97	2·387	−0·126
30	61·63	2·086	·070	223·70	2·397	+0·011	180·86	2·422	−0·015
60	91·63	2·182	·047	253·59	2·464	·127	210·74	2·513	+0·106
90	121·62	2·328	+0·009	283·60	2·560	·218	240·73	2·644	·210
120	151·60	2·493	−0·037	313·72	2·668	·256	270·83	2·794	·266
150	181·60	2·629	·078	343·83	2·759	·223	300·95	2·921	·250
180	211·61	2·683	·098	13·82	2·799	+0·123	330·97	2·976	·158
210	241·63	2·629	·088	43·70	2·768	−0·012	0·86	2·931	+0·018
240	271·63	2·504	·054	73·59	2·677	·138	30·74	2·804	−0·118
270	301·62	2·328	−0·009	103·60	2·560	·218	60·73	2·644	·210
300	331·60	2·183	+0·032	133·72	2·456	·235	90·83	2·503	·239
330	1·60	2·087	·062	163·83	2·389	·193	120·95	2·414	·207
0	31·61	2·053	+0·075	193·82	2·370	−0·104	150·97	2·387	−0·126

v	l	$r\cos b$	$r\sin b$
(33) *Polyhymnia* $8^m\cdot2$.			
°	°		
0	342·28	1·892	−0·029
15	357·27	1·909	−0·013
30	12·26	1·959	+0·004
45	27·25	2·044	·021
60	42·25	2·166	·040
75	57·25	2·329	·059
90	72·25	2·533	·076
105	87·26	2·776	·092
120	102·26	3·049	·103
135	117·27	3·330	·107
150	132·28	3·584	·102
165	147·28	3·765	·085
180	162·28	3·831	·059
195	177·27	3·766	+0·026
210	192·26	3·586	−0·007
225	207·25	3·332	·035
240	222·25	3·050	·056
255	237·25	2·776	·070
270	252·25	2·533	·076
285	267·26	2·328	·077
300	282·26	2·166	·073
315	297·27	2·043	·066
330	312·28	1·958	·055
344	327·28	1·909	·043
0	342·28	1·892	−0·029
(37) *Fides* $7^m\cdot2$.			
0	65·88	2·170	+0·100
30	95·91	2·213	·120
60	125·92	2·346	·113
90	155·95	2·557	·074
120	185·92	2·807	+0·006
150	215·88	3·022	−0·076
180	245·88	3·107	·143
210	275·91	3·018	·164
240	305·92	2·804	·135
270	335·95	2·557	·074
300	5·92	2·349	−0·005
330	35·88	2·216	+0·056
0	65·28	2·170	+0·100

l	$r\cos b$	$r\sin b$
(35) *Leukothea* $8^m\cdot3$.		
°		
201·38	2·314	−0·144
216·31	2·323	·218
231·33	2·361	·281
246·42	2·428	·330
261·56	2·527	·363
276·72	2·657	·376
291·84	2·817	·365
306·90	2·998	·325
321·88	3·189	·256
336·79	3·373	·158
351·65	3·526	−0·036
6·50	3·626	+0·098
21·38	3·656	·228
36·31	3·612	·339
51·33	3·502	·417
66·42	3·346	·455
81·56	3·167	·455
96·72	2·986	·423
111·84	2·817	·365
126·90	2·668	·290
141·88	2·545	·204
156.79	2·448	·115
171·65	2·377	+0·024
186·50	2·333	−0·063
201·38	2·314	−0·144
(38) *Leda* $8^m\cdot0$.		
100·38	2·314	+0·078
130·17	2·357	−0·069
160·05	2·473	·209
190·15	2·657	·312
220·37	2·879	·341
250·48	3·077	·270
280·38	3·163	−0·106
310·17	3·087	+0·090
340·05	2·888	·244
10·15	2·657	·312
40·37	2·465	·292
70·48	2·349	·206
100·38	2·314	+0·078

l	$r\cos b$	$r\sin b$
(36) *Atalante* $8^m\cdot6$.		
°		
41·33	1·868	+0·423
56·48	1·857	0·528
72·02	1·881	0·608
87·80	1·946	0·659
103·61	2·059	0·676
119·21	2·220	0·652
134·44	2·426	0·580
149·25	2·668	0·453
163·71	2·927	0·268
177·96	3·173	+0·026
192·19	3·370	−0·253
206·60	3·482	0·539
221·33	3·487	0·789
236·48	3·389	0·964
252·02	3·216	1·039
267·80	3·005	1·017
283·61	2·792	0·916
299·21	2·596	0·763
314·44	2·426	0·580
329·25	2·281	0·388
343·71	2·158	0·197
357·96	2·055	−0·017
12·19	1·971	+0·148
26·60	1·908	0·295
41·33	1·868	+0·423
(40) *Harmonia* $6^m\cdot9$.		
1·13	2·146	−0·161
31·22	2·170	·144
61·21	2·214	·089
91·15	2·262	−0·008
121·07	2·315	+0·079
151·07	2·353	·148
181·13	2·366	·176
211·22	2·353	·156
241·21	2·314	·093
271·15	2·262	+0·008
301·07	2·215	−0·076
331·07	2·170	·136
1·13	2·146	−0·161

v	(39) *Lætitia* $6^m.0$. l	$r\cos b$	$r\sin b$	(41) *Daphne* $7^m.0$. l	$r\cos b$	$r\sin b$	(42) *Isis* $7^m.7$. l	$r\cos b$	$r\sin b$
°	°			°			°		
0	2·76	2·444	−0·192	219·72	2·000	+0·373	317·98	1·876	−0·221
15	17·66	2·443	·290	234·80	1·994	·471	333·07	1·883	·264
30	32·69	2·453	·369	250·16	2·021	·546	348·22	1·916	·287
45	47·83	2·491	·430	265·71	2·085	·593	3·39	1·975	·295
60	63·06	2·542	·464	281·30	2·190	·609	18·53	2·062	·285
75	78·30	2·612	·469	296·75	2·336	·588	33·61	2·193	·258
90	93·50	2·696	·442	311·94	2·521	·524	48·60	2·307	·205
105	108·59	2·789	·383	326·84	2·734	·412	63·51	2·456	·134
120	123·56	2·883	·292	341·48	2·965	·251	78·36	2·610	−0·044
135	138·42	2·967	·175	355·94	3·170	+0·045	93·20	2·755	+0·061
150	153·19	3·032	−0·039	10·38	3·338	−0·191	108·06	2·873	·171
165	167·95	3·069	+0·104	24·93	3·436	·432	122·98	2·948	·275
180	182·76	3·075	·242	39·72	3·446	·644	137·98	2·969	·358
195	197·66	3·049	·361	54·80	3·370	·797	153·07	2·933	·411
210	212·69	2·998	·451	70·16	3·228	·872	168·22	2·846	·426
225	227·83	2·929	·505	85·71	3·049	·868	183·39	2·725	·406
240	243·06	2·850	·520	101·39	2·860	·796	198·53	2·586	·357
255	258·30	2·771	·497	116·75	2·681	·675	213·61	2·443	·287
270	273·50	2·696	·442	131·94	2·521	·524	228·60	2·307	·205
285	288·59	2·629	·361	146·84	2·382	·359	243·51	2·185	·120
300	303·56	2·571	·261	161·48	2·270	·192	258·36	2·081	+0·035
315	318·42	2·523	·149	175·94	2·167	−0·031	273·20	1·997	−0·044
330	333·19	2·489	+0·032	190·38	2·090	+0·120	288·06	1·934	·115
345	347·95	2·459	−0·083	204·93	2·033	·255	302·98	1·893	·177
0	2·76	2·444	−0·192	219·72	2·000	+0·373	317·98	1·876	−0·221

v	(43) *Ariadne* $7^m.9$. l	$r\cos b$	$r\sin b$	(44) *Nysa* $7^m.1$. l	$r\cos b$	$r\sin b$	(45) *Eugenia* $7^m.3$. l	$r\cos b$	$r\sin b$
0	278·23	1·832	+0·026	111·70	2·054	−0·044	232·20	2·483	+0·285
30	308·20	1·866	·078	141·64	2·091	+0·025	262·38	2·511	·264
60	338·22	1·971	·115	171·61	2·198	·092	292·41	2·591	·174
90	8·27	2·137	·126	201·63	2·362	·144	322·27	2·702	+0·031
120	38·30	2·335	·102	231·69	2·556	·163	352·09	2·814	−0·133
150	68·28	2·505	+0·043	261·73	2·722	·134	22·05	2·895	·271
180	98·23	2·573	−0·037	291·70	2·790	+0·060	52·20	2·923	·336
210	128·20	2·503	·105	321·64	2·725	−0·032	82·38	2·891	·304
240	158·22	2·333	·136	351·61	2·559	·108	112·41	2·811	·189
270	188·27	2·137	·126	21·63	2·362	·144	142·27	2·702	−0·031
300	218·30	1·972	·086	51·69	2·195	·140	172·09	2·594	+0·123
330	248·28	1·868	−0·025	81·73	2·089	·103	202·05	2·514	·235
0	278·23	1·832	+0·026	111·70	2·054	−0·044	232·20	2·483	+0·285

	(46) *Hestia* 7m·7.			(47) *Aglaja* 7m·5.			(48) *Doris* 6m·8.		
v	*l*	*r* cos *b*	*r* sin *b*	*l*	*r* cos *b*	*r* sin *b*	*l*	*r* cos *b*	*r* sin *b*
°	°			°			°		
0	356·39	2·105	+0·010	314·86	2·503	−0·165	71·23	2·900	−0·303
30	26·37	2·146	−0·034	344·82	2·547	−0·073	101·41	2·921	·331
60	56·36	2·266	·072	14·71	2·662	+0·044	131·55	2·994	·274
90	86·38	2·453	·098	44·64	2·831	·162	161·50	3·099	−0·140
120	116·40	2·676	·099	74·68	3·023	·250	191·33	3·205	+0·041
150	146·41	2·867	·069	104·79	3·185	·274	221·19	3·277	·221
180	176·39	2·944	−0·014	134·86	3·254	·215	251·23	3·297	·345
210	206·37	2·867	+0·045	164·82	3·196	+0·091	281·41	3·264	·370
240	236·36	2·676	·086	194·71	3·033	−0·050	311·55	3·192	·292
270	266·38	2·453	·098	224·64	2·831	·162	341·50	3·099	+0·140
300	296·40	2·265	·083	254·68	2·653	·219	11·33	3·006	−0·038
330	326·41	2·146	·052	284·79	2·538	·218	41·19	2·933	·198
0	356·39	2·105	+0·010	314·86	2·503	−0·165	71·23	2·900	−0·303
	(49) *Pales* 7m·0.			(50) *Virginia* 8m·5.			(51) *Nemausa* 7m·3.		
0	31·32	2·376	+0·128	9·91	1·896	−0·026	174·39	2·208	−0·009
30	61·35	2·439	·101	39·89	1·953	·069	204·01	2·219	+0·184
60	91·33	2·625	+0·047	69·91	2·130	·102	233·99	2·254	·336
90	121·29	2·928	−0·030	99·94	2·434	·114	264·35	2·320	·407
120	151·26	3·307	·118	129·96	2·839	·096	294·74	2·408	·329
150	181·28	3·653	·189	159·94	3·232	−0·037	324·76	2·489	·225
180	211·32	3·799	·204	189·91	3·405	+0·047	354·39	2·523	+0·010
210	241·35	3·655	·151	219·89	3·230	·114	24·01	2·490	−0·207
240	271·33	3·309	−0·061	249·91	2·837	·135	53·99	2·410	·359
270	301·29	2·928	+0·030	279·94	2·434	·114	84·35	2·320	·407
300	331·26	2·624	·094	309·96	2·132	·072	114·74	2·253	·345
330	1·28	2·438	·126	339·94	1·954	+0·023	144·76	2·217	·200
0	31·32	2·376	+0·128	9·91	1·896	−0·026	174·39	2·208	−0 009
	(52) *Europa* 6m·2.			(53) *Kalypso* 8m·4.			(55) *Pandora* 7m·4.		
0	107·22	2·745	−0·137	92·75	2·074	−0·145	12·29	2·356	+0·006
30	136·99	2·786	+0·047	122·71	2·127	−0·069	42·10	2·392	·157
60	166·82	2·886	·228	152·60	2·273	+0·031	72·11	2·502	·278
90	196·88	3·035	·366	182·52	2·504	·140	102·31	2·681	·340
120	227·11	3·212	·416	212·56	2·785	·232	132·51	2·899	·313
150	257·28	3·368	·348	242·67	3·040	·269	162·49	3·090	+0·186
180	287·22	3·439	+0·171	272·75	3·150	·220	192·29	3·167	−0·008
210	316·99	3·385	−0·057	302·71	3·050	+0·099	222·10	3·089	·203
240	346·82	3·228	·255	332·60	2·795	−0·038	252·11	2·898	·322
270	16·88	3·035	·366	2·52	2·504	·140	283·31	2·681	·340
300	47·11	2 871	·372	32·56	2·265	·189	312·51	2·503	·270
330	77·28	2·772	·287	62·67	2·120	·187	342·49	2·393	−0·144
0	107·22	2·745	−0·137	92·75	2·074	−0·145	12·29	2·356	+0·006

v	(54) *Alexandra* $7^m{\cdot}6$. l	$r\cos b$	$r\sin b$	(56) *Melete* $8^m{\cdot}6$. l	$r\cos b$	$r\sin b$	(57) *Mnemosyne* $6^m{\cdot}5$. l	$r\cos b$	$r\sin b$
°	°			°			°		
0	295·74	2·177	−0·141	294·69	1·968	+0·273	51·90	2·752	−0·397
15	310·45	2·193	−0·027	309·81	1·983	·252	66·80	2·738	·543
30	325·14	2·218	+0·091	324·87	2·027	·217	81·99	2·743	·659
45	339·90	2·282	·209	339·85	2·097	·167	97·40	2·773	·736
60	354·78	2·354	·321	354·76	2·193	·103	112·93	2·832	·769
75	9·82	2·447	·422	9·63	2·313	+0·026	128·43	2·920	·752
90	25·01	2·560	·504	24·49	2·453	−0·062	143·76	3·031	·684
105	40·31	2·692	·559	39·37	2·609	·157	158·83	3·154	·563
120	55·62	2·835	·578	54·31	2·770	·252	173·64	3·277	·394
135	70·87	2·979	·552	69·32	2·925	·339	188·23	3·383	−0·186
150	85·98	3·107	·479	84·41	3·056	·406	202·72	3·458	+0·047
165	100·94	3·199	·362	99·54	3·146	·442	217·23	3·492	·283
180	115·74	3·240	·209	114·69	3·179	·441	231·90	3·483	·502
195	130·45	3·219	+0·039	129·81	3·151	·400	246·80	3·436	·682
210	145·14	3·141	−0·128	144·87	3·065	·328	261·99	3·362	·807
225	159·90	3·017	·276	159·85	2·935	·233	277·40	3·274	·869
240	174·78	2·867	·391	174·76	2·778	·130	292·93	3·185	·864
255	189·82	2·709	·467	189·63	2·613	−0·029	308·43	3·103	·799
270	205·01	2·560	·504	204·49	2·453	+0·062	323·76	3·031	·684
285	220·31	2·431	·505	219·37	2·309	·139	338·83	2·968	·530
300	235·62	2·328	·474	234·31	2·187	·199	353·64	2·914	·350
315	250·87	2·253	·418	249·32	2·090	·242	8·23	2·865	+0·157
330	265·98	2·204	·340	264·41	2·021	·268	22·72	2·820	−0·038
345	280·94	2·180	·246	279·54	1·980	·278	37·23	2·782	·225
0	295·74	2·177	−0·141	294·69	1·968	+0·273	51·90	2·752	−0·397

	(58) *Concordia* $8^m{\cdot}3$. l	$r\cos b$	$r\sin b$	(59) *Elpis* $7^m{\cdot}6$. l	$r\cos b$	$r\sin b$	(67) *Echo* $8^m{\cdot}5$. l	$r\cos b$	$r\sin b$
0	189·29	2·583	+0·106	18·25	2·389	−0·168	99·23	1·952	−0·122
30	219·28	2·593	·193	48·23	2·409	·309	129·28	1·994	·111
60	249·37	2·629	·231	78·50	2·499	·379	159·28	2·118	·071
90	279·47	2·687	·209	108·79	2·652	·354	189·24	2·314	−0·007
120	309·48	2·751	·129	138·81	2·833	·226	219·19	2·546	+0·073
150	339·39	2·799	+0·009	168·54	2·978	−0·016	249·18	2·746	·145
180	9·29	2·813	−0·115	198·25	3·024	+0·213	279·23	2·827	·177
210	39·28	2·791	·208	228·23	2·954	·378	309·28	2·746	·153
240	69·37	2·743	·241	258·50	2·810	·426	339·28	2·546	·086
270	99·47	2·687	·209	288·79	2·652	·354	9·24	2·314	+0·007
300	129·48	2·636	·123	318·81	2·520	·201	39·19	2·119	−0·061
330	159·39	2·600	−0·009	348·54	2·429	+0·013	69·18	1·994	·105
0	189·29	2·583	+0·106	18·25	2·389	−0·168	99·23	1·952	−0·122

	(62) *Erato* $8^m{\cdot}2$.			(63) *Ausonia* $7^m{\cdot}3$			(64) *Angelina* $7^m{\cdot}2$.		
v	l	$r\cos b$	$r\sin b$	l	$r\cos b$	$r\sin b$	l	$r\cos b$	$r\sin b$
°	°			°			°		
0	39·00	2·574	−0·099	271·06	2·086	−0·194	124·37	2·348	+0·006
30	69·01	2·627	·085	301·09	2·123	·129	154·36	2·383	−0·022
60	99·01	2·783	−0·048	330·99	2·218	−0·027	184·36	2·485	·046
90	128·99	3·028	+0·007	0·84	2·356	+0·093	214·36	2·640	·061
120	158·97	3·318	·070	30·81	2·508	·203	244·37	2·815	·060
150	188·98	3·569	·123	60·92	2·632	·265	274·37	2·959	·041
180	219·00	3·670	·141	91·06	2·685	·250	304·37	3·016	−0·008
210	249·01	3·569	·115	121·09	2·641	·160	334·36	2·960	+0·027
240	279·01	3·319	+0·058	150·99	2·516	+0·031	4·36	2·815	·052
270	308·99	3·028	−0·007	180·84	2·356	−0·093	34·36	2·640	·061
300	338·97	2·783	·059	210·81	2·211	·179	64·37	2·485	·053
330	8·98	2·627	·090	240·92	2·116	·213	94·37	2·383	·033
0	39·00	2·574	−0·099	271·06	2·086	−0·194	124·37	2·348	+0·006

	(65) *Cybele* $6^m{\cdot}4$.			(66) *Maja* $9^m{\cdot}0$.			(67) *Asia* $8^m{\cdot}5$.		
0	261·14	3·051	+0·182	47·24	2·177	+0·074	306·52	1·955	+0·199
30	291·17	3·094	·139	77·26	2·219	·112	336·61	2·003	·151
60	321·14	3·214	+0·059	107·30	2·351	·125	6·53	2·134	+0·062
90	351·09	3·390	−0·044	137·33	2·560	·107	36·38	2·334	−0·058
120	21·06	3·583	·147	167·31	2·809	+0·054	66·29	2·570	·186
150	51·08	3·738	·217	197·27	3·024	−0·025	96·37	2·792	·279
180	81·14	3·799	·226	227·24	3·109	·106	126·52	2·860	·291
210	111·17	3·740	·168	257·26	3·021	·152	156·61	2·781	·210
240	141·14	3·585	−0·066	287·30	2·806	·150	186·53	2·576	−0·075
270	171·09	3·390	+0·044	317·33	2·560	·107	216·38	2·334	+0·058
300	201·06	3·212	·132	347·31	2·354	−0·046	246·29	2·129	·154
330	231·08	3·092	·179	17·27	2·222	+0·019	276·37	1·998	·201
0	261·14	3·051	+0·182	47·24	2·177	+0·074	306·52	1·955	+0·199

	(68) *Leto* $7^m{\cdot}0$.			(69) *Hesperia* $6^m{\cdot}8$.			(72) *Feronia* $8^m{\cdot}9$.		
0	346·18	2·252	−0·269	108·58	2·447	−0·357	308·13	1·986	+0·185
30	16·17	2·312	−0·155	138·78	2·507	·279	338·21	2·019	·146
60	45·92	2·460	+0·006	168·65	2·663	−0·126	8·16	2·107	+0·067
90	75·69	2·681	·192	198·34	2·892	+0·083	38·04	2·234	−0·037
120	105·70	2·940	·359	228·15	3·147	·307	67·96	2·372	·144
150	135·94	3·170	·443	258·27	3·360	·473	98·00	2·483	·221
180	166·18	3·275	·391	288·58	3·450	·503	128·13	2·527	·230
210	196·17	3·194	+0·215	318·78	3·372	·375	158·21	2·486	·179
240	225·92	2·962	−0·008	348·65	3·159	+0·149	188·16	2·375	−0·076
270	255·69	2·681	·192	18·34	2·892	−0·083	218·04	2·234	+0·037
300	285·70	2·442	·298	48·15	2·654	·259	247·96	2·104	·128
330	315·94	2·295	·321	78·27	2·497	·352	278·80	2·016	·179
0	346·18	2·252	−0·269	108·58	2·447	−0·357	308·13	1·986	+0·185

	(61) *Danaë* 7m·1.			(70) *Panopæa* 7m·8.			(71) *Niobe* 7m·3.		
v	l	r cos b	r sin b	l	r cos b	r sin b	l	r cos b	r sin b
°	°			°			°		
0	343·56	2·488	+0·141	300·31	2·101	−0·412	221·79	2·087	−0·895
15	357·89	2·477	·344	315·60	2·108	·430	238·09	2·104	0·886
30	12·53	2·481	·530	330·91	2·143	·430	254·11	2·166	0·823
45	27·58	2·503	·691	346·14	2·205	·400	269·57	2·266	0·709
60	43·05	2·551	·817	1·25	2·293	·344	284·37	2·393	0·543
75	58·81	2·632	·899	16·19	2·401	·261	298·61	2·532	0·330
90	74·65	2·748	·927	30·99	2·524	·153	312·48	2·669	−0·075
105	90·33	2·896	·891	45·70	2·653	−0·022	326·28	2·789	+0·209
120	105·67	3·063	·786	60·40	2·778	+0·122	340·29	2·883	0·505
135	120·57	3·227	·611	75·17	2·888	·271	354·76	2·944	0·789
150	135·09	3·364	·375	90·06	2·972	·409	9·86	2·975	1·030
165	149·37	3·450	+0·097	105·11	3·021	·522	25·60	2·983	1·201
180	163·56	3·474	−0·197	120·31	3·031	·594	41·79	2·976	1·276
195	177·89	3·419	·474	135·60	3·003	·618	58·09	2·963	1·247
210	192·53	3·311	·707	150·91	2·941	·590	74·11	2·943	1·119
225	207·58	3·166	·874	166·14	2·854	·518	89·57	2·909	0·910
240	223·05	3·011	·965	181·25	2·750	·385	104·37	2·854	0·648
255	238·81	2·867	·980	196·19	2·638	·287	118 61	2·773	0·361
270	254·65	2·748	·927	210·99	2·524	·153	132·48	2·669	+0·075
285	270·33	2·658	·818	225·70	2·416	+0·020	146·28	2·546	−0·191
300	285·67	2·595	·666	240·40	2·316	−0·102	160·29	2·417	0·424
315	300·57	2·551	·483	255·17	2·232	·209	174·76	2·294	0·615
330	315·09	2·521	·281	270·06	2·165	·298	189·86	2·190	0·758
345	329·37	2·499	−0·070	285·11	2·121	·366	205·60	2·117	0·852
0	343·56	2·488	+0·141	300·31	2·101	−0·412	221·79	2·087	−0·895
	(73) *Klytia* 8m·8.			(74) *Galatea* 8m·3.			(76) *Freia* 7m·4.		
0	57·44	2·543	+0·082	8·27	2·114	+0·025	90·81	2·833	−0·087
30	87·46	2·557	·106	38·20	2·169	−0·053	120·82	2·888	·103
60	117·48	2·598	·102	68·17	2·341	·126	150·84	3·054	·096
90	147·49	2·658	·072	98·22	2·613	·180	180·84	3·315	·062
120	177·48	2·719	+0·020	128·29	2·900	·195	210·83	3·624	−0·006
150	207·45	2·765	−0·039	158·31	3·299	·147	240·81	3·888	+0·067
180	237·44	2·782	·089	188·27	3·441	−0·040	270·81	3·993	·122
210	267·46	2·763	·114	218·20	3·301	+0·080	300·82	3·886	·139
240	297·48	2·717	·107	248·17	2·970	·160	330·84	3·622	·114
270	327·49	2·658	·072	278·22	2·613	·180	0·84	3·315	·062
300	357·48	2·600	−0·019	308·29	2·334	·153	30·83	3·056	+0·002
330	27·45	2·559	+0·037	338·31	2·168	·097	60·81	2·890	−0·050
0	57·44	2·543	+0·082	8·27	2·114	+0·025	90·81	2·833	−0·087

	(75) *Eurydike* 8m·4.			(78) *Diana* 7m·5.			(80) *Sappho* 8m·2.		
v	*l*	*r* cos *b*	*r* sin *b*	*l*	*r* cos *b*	*r* sin *b*	*l*	*r* cos *b*	*r* sin *b*
°	°			°			°		
0	335·41	1·852	−0·067	122·74	2·053	+0·161	355·87	1·827	+0·188
15	350·36	1·868	−0·027	137·62	2·070	·088	10·81	1·843	·130
30	5·31	1·914	+0·016	152·46	2·109	+0·008	25·69	1·877	+0·063
45	20·26	1·989	·061	167·30	2·169	−0·077	40·52	1·931	−0·010
60	35·23	2·097	·106	182·17	2·250	·163	55·36	2·002	·088
75	50·22	2·238	·151	197·12	2·352	·246	70·25	2·088	·167
90	65·25	2·413	·192	212·16	2·473	·321	85·22	2·191	·242
105	80·29	2·619	·226	227·27	2·611	·381	100·27	2·304	·308
120	95·35	2·848	·248	242·43	2·756	·420	115·40	2·423	·358
135	110·40	3·079	·253	257·60	2·900	·429	130·57	2·538	·385
150	125·43	3·286	·234	272·73	3·025	·403	145·73	2·638	·382
165	140·44	3·432	·191	287·78	3·113	·341	160·84	2·709	·347
180	155·41	3·486	·127	302·74	3·151	·248	175·87	2·740	·282
195	170·36	3·437	+0·050	317·62	3·129	·133	190·81	2·725	·192
210	185·31	3·294	−0·027	332·46	3·051	−0·011	205·69	2·664	−0·090
225	200·26	3·088	·094	347·30	2·929	+0·104	220·52	2·567	+0·013
240	215·23	2·855	·145	2·17	2·781	·201	235·36	2·447	·107
255	230·22	2·623	·177	17·12	2·624	·274	250·25	2·317	·185
270	245·25	2·413	·192	32·16	2·473	·321	265·22	2·191	·242
285	260·29	2·235	·193	47·27	2·340	·342	280·27	2·077	·277
300	275·35	2·092	·183	62·43	2·231	·340	295·40	1·982	·293
315	290·40	1·984	·163	77·60	2·147	·318	310·57	1·909	·289
330	305·43	1·909	·136	92·73	2·091	·279	325·73	1·859	·270
345	320·44	1·866	·104	107·78	2·060	·226	340·84	1·832	·235
0	335·41	1·852	−0·067	122·74	2·053	+0·161	355·87	1·827	+0·188
	(77) *Frigga* 7m·9.			(79) *Eurynome* 7m·8.			(82) *Alkmene* 8m·3.		
0	59·03	2·318	+0·084	44·32	1·968	−0·048	131·51	2·145	+0·103
30	89·05	2·354	·101	74·28	2·009	·120	161·53	2·200	·078
60	119·07	2·481	·095	104·34	2·136	·168	191·51	2·363	+0·031
90	149·07	2·623	·061	134·43	2·344	·180	221·47	2·626	−0·033
120	179·05	2·781	+0·006	164·47	2·601	·141	251·45	2·953	·103
150	209·03	2·958	−0·058	194·41	2·827	−0·049	281·47	3·249	·156
180	239·03	3·016	·109	224·32	2·918	+0·071	311·51	3·374	·162
210	269·05	2·956	·127	254·28	2·822	·168	341·53	3·251	·115
240	299·07	2·779	·106	284·34	2·596	·205	11·51	2·954	−0·039
270	329·07	2·623	·061	314·43	2·344	·180	41·47	2·626	+0·033
300	359·05	2·483	−0·005	344·47	2·140	·116	71·45	2·361	·082
330	29·03	2·356	+0·046	14·41	2·012	+0·035	101·47	2·199	·106
0	59·03	2·318	+0·084	44·32	1·968	−0·048	131·51	2·145	+0·103

v	(81) *Terpsichore* 8m·2. l	r cos b	r sin b	(84) *Klio* 8m·8. l	r cos b	r sin b	(85) *Io* 7m·7. l	r cos b	r sin b
°	°			°			°		
0	48·43	2·240	+0·223	339·24	1·806	+0·061	323·60	2·108	+0·384
15	63·47	2·248	·273	354·08	1·813	·134	338·69	2·131	·317
30	78·57	2·284	·308	9·01	1·843	·202	353·61	2·178	·230
45	93·71	2·350	·327	24·04	1·895	·261	8·39	2·246	·125
60	108·85	2·444	·327	39·17	1·973	·309	23·09	2·331	+0·006
75	123·94	2·567	·306	54·35	2·076	·342	37·78	2·432	−0·124
90	138·98	2·714	·261	69·55	2·203	·355	52·55	2·543	·258
105	153·93	2·877	·193	84·71	2·351	·344	67·45	2·662	·387
120	168·83	3·046	+0·102	99·78	2·511	·306	82·53	2·784	·501
135	183·69	3·204	−0·007	114·74	2·667	·237	97·75	2·901	·586
150	198·56	3·333	·126	129·62	2·799	·141	113·06	3·003	·631
165	213·46	3·415	·243	144·43	2·888	+0·024	128·37	3·078	·626
180	228·43	3·438	·343	159·24	2·917	−0·099	143·60	3·116	·568
195	243·47	3·399	·413	174·08	2·880	·214	158·69	3·107	·462
210	258·57	3·306	·446	189·01	2·786	·305	173·61	3·052	·322
225	273·71	3·174	·442	204·04	2·652	·365	188·39	2·955	·165
240	288·85	3·021	·404	219·17	2·499	·391	203·09	2·829	−0·007
255	303·94	2·864	·341	234·35	2·345	·386	217·78	2·687	+0·137
270	318·98	2·714	·261	249·55	2·203	·355	232·55	2·543	·258
285	333·93	2·579	·173	264·71	2·081	·305	247·45	2·409	·350
300	348·83	2·465	−0·083	279·78	1·982	·241	262·53	2·295	·413
315	3·69	2·372	+0·005	294·74	1·906	·169	277·75	2·205	·446
330	18·56	2·303	·087	309·62	1·852	·093	293·06	2·144	·451
345	33·46	2·259	·161	324·43	1·818	−0·015	308·37	2·112	·430
0	48·43	2·240	+0·223	339·24	1·806	+0·061	323·60	2·108	+0·384
	(83) *Beatrix* 8m·6.			(86) *Semele* 8m·3.			(88) *Thisbe* 7m·4.		
0	191·13	2·226	+0·055	29·25	2·415	−0·173	309·23	2·321	+0·111
30	221·02	2·250	−0·046	59·24	2·479	−0·099	339·24	2·360	·190
60	250·96	2·312	·139	89·15	2·661	+0·005	9·35	2·486	·228
90	281·01	2·405	·202	119·07	2·949	·128	39·45	2·689	·209
120	311·12	2·510	·213	149·07	3·307	·243	69·44	2·930	+0·127
150	341·18	2·598	·164	179·16	3·632	·304	99·33	3·133	−0·009
180	11·13	2·634	−0·065	209·25	3·772	·270	129·23	3·210	·154
210	41·02	2·602	+0·053	239·24	3·633	+0·146	159·24	3·123	·252
240	70·96	2·515	·151	269·15	3·316	−0·007	189·35	2·920	·267
270	101·01	2·405	·202	299·07	2·949	·128	219·45	2·689	·209
300	131·12	2·308	·196	329·07	2·653	·195	249·44	2·494	−0·108
330	161·18	2·246	·142	359·16	2·472	·207	279·33	2·367	+0·007
0	191·13	2·226	+0·055	29·25	2·415	−0·173	309·23	2·321	+0·111

	(87) *Sylvia* 7m·2.			(89) *Julia* 7m·1.			(92) *Undina* 6m·7.		
v	*l*	*r* cos *b*	*r* sin *b*	*l*	*r* cos *b*	*r* sin *b*	*l*	*r* cos *b*	*r* sin *b*
°	°			°			°		
0	334·65	3·144	−0·596	352·29	2·054	+0·388	327·72	2·840	−0·352
15	349·92	3·151	·608	7·37	2·043	·490	342·79	2·838	·431
30	5·18	3·182	·581	22·74	2·058	·565	357·94	2·857	·484
45	20·34	3·235	·516	38·30	2·102	·609	13·17	2·897	·508
60	35·37	3·305	·416	53·91	2·178	·618	28·38	2·958	·499
75	50·26	3·386	·284	69·38	2·283	·587	43·54	3·038	·457
90	65·05	3·470	−0·127	84·59	2·414	·513	58·59	3·129	·382
105	79·78	3·550	+0·046	99·49	2·558	·396	73·53	3·226	·276
120	94·53	3·619	·223	114·12	2·702	·237	88·37	3·318	−0.144
135	109·37	3·673	·391	128·57	2 829	+0·045	103·16	3·397	+0·004
150	124·33	3·718	·536	142·98	2·921	−0·166	117·94	3·453	·158
165	139·43	3·727	·645	157·52	2·965	·375	132·79	3·482	·305
180	154·65	3·727	·707	172·29	2·959	·559	147·72	3·482	·431
195	169·92	3·714	·716	187·37	2·907	·697	162·79	3·456	·524
210	185·18	3·687	·673	202·74	2·821	·774	177·94	3·408	·577
225	200·34	3·648	·582	218·30	2·717	·787	193·17	3·345	·586
240	215·37	3·598	·452	233·91	2·610	·740	208·38	3·275	·553
255	230·26	3·538	·296	249·38	2·507	·644	223·54	3·202	·482
270	245·05	3·470	+0·127	264·59	2·414	·513	238·59	3·129	·382
285	259·78	3·397	−0·044	279·49	2·330	·360	253·53	3·061	·262
300	274·53	3·324	·205	294·12	2·255	·198	268·37	2·997	+0·131
315	289·37	3·257	·347	308·57	2·188	−0·035	283·16	2·941	−0·004
330	304·33	3·208	·463	322·98	2·131	+0·121	297·94	2·894	·133
345	319·43	3·162	·547	337·52	2·085	·264	312·79	2·860	·251
0	334·65	3·144	−0·596	352·29	2·054	+0·388	327·72	2·840	−0·352

	(90) *Antiope* 7m·5.			(91) *Egina* 8m·2.			(93) *Minerva* 7m·4.		
0	301·19	2·620	−0·080	82·17	2·308	+0·082	274·70	2·346	−0·355
30	331·21	2·671	·104	112·19	2·338	·086	304·99	2·392	·314
60	1·23	2·821	·105	142·20	2·427	·068	334·99	2·520	·191
90	31·24	3·056	·078	172·19	2·559	+0·031	4·71	2·703	−0·003
120	61·22	3·334	−0·023	202·17	2·705	−0·020	44·43	2·896	+0·214
150	91·20	3·570	+0·048	232·16	2·823	·070	64·43	3·046	·396
180	121·19	3·664	·111	262·17	2·868	·101	94·70	3·103	·469
210	151·21	3·567	·140	292·19	2·822	·103	124·99	3·046	·400
240	181·23	3·331	·125	322·20	2·704	·076	154·99	2·896	·220
270	211·24	3·056	·078	352·19	2·559	−0·031	184·71	2·703	+0·003
300	241·22	2·823	+0·020	22·17	2·428	+0·018	214·43	2·520	−0·186
330	271·20	2·673	−0·036	52·16	2·339	·058	244·43	2·392	·311
0	301·19	2·620	−0·080	82·17	2·308	+0·082	274·70	2·346	−0·355

	(95) *Arethusa* 7m·3.			(96) *Ægle* 7m·4.			(97) *Klotho* 7m·4.		
v	*l*	*r* cos *b*	*r* sin *b*	*l*	*r* cos *b*	*r* sin *b*	*l*	*r* cos *b*	*r* sin *b*
°	°			°			°		
0	34·26	2·608	+0·299	162·57	2·609	−0·253	65·47	1·948	−0·404
15	49·00	2·632	·159	177·23	2·598	·423	80·79	1·963	·402
30	63·64	2·670	+0·006	192·17	2·604	·570	96·05	2·010	·378
45	78·28	2·722	−0·151	207·42	2·632	·686	111·18	2·090	·331
60	93·00	2·786	·307	222·92	2·687	·764	126·15	2·199	·259
75	107·89	2·861	·452	238·52	2·772	·797	140·97	2·337	·163
90	122·98	2·950	·578	254·07	2·886	·778	155·68	2·496	−0·045
105	138·24	3·050	·672	269·40	3·022	·702	170·37	2·672	+0·094
120	153·61	3·159	·724	284·43	3·165	·570	185·11	2·851	·246
135	168·98	3·270	·725	299·17	3·297	·384	199·98	3·020	·399
150	184·26	3·372	·669	313·68	3·400	−0·159	215·00	3·159	·535
165	199·36	3·451	·558	328·10	3·458	+0·089	230·18	3·251	·635
180	214·26	3·494	·400	342·57	3·463	·336	245·47	3·281	·681
195	229·00	3·490	·210	357·23	3·414	·555	260·79	3·245	·665
210	243·64	3·438	−0·008	12·17	3·325	·727	276·05	3·149	·592
225	258·28	3·345	+0·186	27.42	3·212	·837	291·18	3·008	·476
240	273·00	3·222	·355	42·92	3·093	·880	306·15	2·842	·335
255	287·89	3·085	·488	58·52	2·982	·857	320·97	2·667	·187
270	302·98	2·950	·578	74·07	2·886	·778	355·68	2·496	+0·045
285	318·24	2·829	·623	89·40	2·810	·653	350·37	2·341	−0·083
300	333·61	2·732	·626	104·43	2·749	·495	5·11	2·206	·191
315	348·98	2·662	·590	119·17	2·701	·315	19·98	2·097	·277
330	4·26	2·619	·520	133·68	2·662	+0·124	35·00	2·016	·342
345	19·36	2·603	·421	148·10	2·631	−0·068	50·18	1·966	·384
0	34·26	2·608	+0·299	162·57	2·609	−0·253	65·47	1·948	−0·404

	(94) *Aurora* 7m·1.			(100) *Hekate* 7m·8.			(103) *Hera.* 6m·9.		
0	49·37	2·887	+0·291	306·45	2·575	+0·008	320·97	2·489	−0·020
30	79·52	2·905	·398	336·30	2·641	−0·139	350·87	2·510	·135
60	109·80	2·989	·408	6·28	2·760	·262	20·89	2·574	·220
90	139·94	3·126	·309	36·43	2·985	·334	51·01	2·673	·252
120	169·79	3·275	+0·115	66·59	3·261	·321	81·11	2·786	·216
150	199·51	3·381	−0·127	96·60	3·504	·205	111·09	2·879	−0·116
180	229·37	3·407	·343	126·45	3·604	−0·012	140·97	2·914	+0·023
210	259·52	3·352	·460	156·30	3·505	+0·185	170·87	2·877	·155
240	289·80	3·247	·443	186·28	3·262	·310	200·89	2·785	·238
270	319·94	3·126	·309	216·43	2·985	·334	231·01	2·673	·252
300	349·79	3·015	−0·106	246·59	2·760	·271	261·11	2·576	·200
330	19·51	2·930	+0·110	276·60	2·621	·153	291·09	2·512	+0·101
0	49·37	2·887	+0·291	306·45	2·575	+0·008	320·97	2·489	−0·020

	(98) *Ianthe* 8m·3.			(101) *Helena* 7m·6.			(102) *Miriam* 9m·4.		
v	*l*	*r* cos *b*	*r* sin *b*	*l*	*r* cos *b*	*r* sin *b*	*l*	*r* cos *b*	*r* sin *b*
°	°			°			°		
0	149·69	2·155	+0·248	328·07	2·223	−0·107	354·97	1·986	+0·105
15	164·24	2·179	+0·104	342·85	2·235	−0·005	9·94	2·001	·066
30	178·70	2·217	−0·049	357·62	2·261	+0·098	24·89	2·044	+0·021
45	193·21	2·267	·206	12·45	2·300	·199	39·83	2·113	−0·027
60	207·88	2·332	·360	27·38	2·352	·292	54·78	2·210	·077
75	222·82	2·411	·503	42·43	2·419	·371	69·75	2·335	·128
90	238·04	2·509	·626	57·60	2·498	·431	84·75	2·485	·177
105	253·50	2·625	·717	72·82	2·589	·464	99·79	2·656	·219
120	269·05	2·757	·763	88·05	2·684	·466	114·84	2 840	·251
135	284·56	2·895	·754	103·22	2·778	·433	129·90	3·021	·266
150	299·88	3·025	·682	118·29	2·859	·365	144 95	3·178	·260
165	314·92	3·126	·549	133·23	2·917	·265	159·97	3·288	·229
180	329·69	3·179	·365	148·07	2·941	·141	174·97	3·329	·177
195	344·24	3·171	−0·151	162·85	2·929	+0·007	189·94	3·294	·108
210	358·70	3·101	+0·069	177·62	2·880	−0·125	204·89	3·189	−0·033
225	13·21	2·980	·271	192·45	2·801	·242	219·83	3·033	+0·039
240	27·88	2·827	·437	207·38	2·704	·335	234·78	2·850	·100
255	42·82	2·664	·556	222·43	2·599	·399	249·75	2·661	·146
270	58·04	2·509	·626	237·60	2·498	·431	264·75	2·485	·177
285	73·50	2·376	·649	252·82	2·409	·432	279·79	2·330	·192
300	89·05	2·274	·629	268·05	2·335	·406	294·84	2·203	·195
315	104·56	2·203	·574	283·22	2·281	·356	309·90	2·105	·185
330	119·88	2·163	·488	298·29	2·245	·286	324·95	2·037	·166
345	134·92	2·148	·377	313·23	2·226	·202	339·97	1·997	·139
0	149·69	2·155	+0·248	328·07	2·223	−0·107	354·97	1·986	+0·105

	(104) *Klymene* 8m·0.			(106) *Dione* 7m.1.			(108) *Hecuba* 7m·4.		
0	59·85	2·659	+0·038	26·18	2·603	−0·127	173·51	2·883	−0·004
30	89·84	2·706	·099	56·11	2·659	−0·027	203·44	2·917	·116
60	119·86	2·849	·140	86·02	2·810	+0·088	233·44	3·016	·203
90	149·89	3·076	·149	116·00	3·061	·198	263·51	3·169	·244
120	179·91	3·337	·117	146·06	3·355	·270	293·59	3·343	·220
150	209·89	3·561	+0·043	176·15	3·613	·270	323·58	3·486	−0·129
180	239·85	3·649	−0·052	206·18	3·723	·182	353·51	3·542	+0·005
210	269·84	3·558	·130	236·11	3·623	+0·036	23·44	3·485	·138
240	299·86	3·335	·164	266·02	3·364	−0·106	53·44	3·342	·225
270	329·89	3·076	·149	296·00	3·061	·198	83·51	3·169	·244
300	359·91	2·851	·100	326·06	2·809	·226	113·59	3·017	·199
330	29·89	2·708	−0·032	356·15	2·652	·198	143·58	2·917	+0·108
0	59·85	2·659	+0·038	26·18	2·603	−0·127	173·51	2·883	−0·004

	(105) *Artemis* 8m·5.			(107) *Camilla* 6m·5.			(109) *Felicitas* 8m·7.		
v	*l*	*r* cos *b*	*r* sin *b*	*l*	*r* cos *b*	*r* sin *b*	*l*	*r* cos *b*	*r* sin *b*
°	°			°			°		
0	240·80	1·864	+0·586	115·47	3·187	−0·485	56·62	1·882	+0·209
15	256·39	1·844	·677	130·53	3·207	·401	71·70	1·892	·246
30	272·38	1·856	·729	145·48	3·242	·290	86·82	1·934	·270
45	288·49	1·906	·739	160·33	3·288	·158	101·97	2·010	·280
60	304·39	1·992	·704	175·12	3·342	−0·012	117·10	2·121	·275
75	319·82	2·109	·620	189·90	3·399	+0·140	132·17	2·267	·252
90	334·70	2·247	·487	204·74	3·457	·287	147·17	2·448	·209
105	349·08	2·389	·306	219·67	3·513	·421	162·09	2·658	·142
120	3·14	2·519	+0·082	234·72	3·566	·530	176·97	2·886	+0·053
135	17·10	2·621	−0·164	249·87	3·615	·605	191·82	3·111	−0·056
150	31·23	2·680	·417	265·08	3·658	·638	206·70	3·305	·176
165	45·75	2·693	·650	280·30	3·691	·625	221·63	3·435	·292
180	60·80	2·662	·837	295·47	3·711	·565	236·62	3·476	·387
195	76·39	2·601	·954	310·53	3·714	·464	251·70	3·419	·444
210	92·38	2·525	·992	325·48	3·698	·330	266·82	3·278	·457
225	108·49	2·448	·950	340·33	3·661	·175	281·97	3·081	·430
240	124·39	2·377	·840	355·12	3·606	+0·013	297·10	2·862	·372
255	139·82	2·311	·680	9·90	3·535	−0·145	312·17	2·645	·294
270	154·70	2·247	·487	24·74	3·457	·287	327·17	2·448	·209
285	169·08	2·181	·279	39·67	3·378	·405	342·09	2·278	·122
300	183·14	2·111	−0·071	54·72	3·305	·491	356·97	2·138	−0·039
315	197·10	2·040	+0·127	69·87	3·247	·543	11·82	2·029	+0·037
330	211·23	1·971	·307	85·08	3·206	·559	26·70	1·950	·104
345	225·75	1·909	·461	100·30	3·186	·539	41·63	1·901	·162
0	240·80	1·864	+0·586	115·47	3·187	−0·485	56·62	1·882	+0·209
	(110) *Lydia* 7m·1.			(111) *Ate* 8m·2.			(112) *Ipligenia* 8m·8.		
0	337·22	2·508	−0·259	110·70	2·323	+0·054	338·36	2.119	+0·024
30	7·32	2·538	·204	140·60	2·352	−0·050	8·34	2·151	·069
60	37·27	2·614	−0·093	170·54	2·434	·147	38·35	2·246	·099
90	67·12	2·717	+0·049	200·59	2·556	·213	68·38	2·390	·106
120	97·01	2·820	·190	230·70	2·696	·226	98·40	2·556	·083
150	127·07	2·898	·286	260·76	2·813	·173	128·38	2·693	+0·033
180	157·22	2·930	·303	290·70	2·862	−0·066	158·36	2·747	−0·031
210	187·32	2·903	·233	320·60	2·818	+0·060	188·34	2·692	·086
240	217·27	2·825	+0·101	350·54	2·701	·163	218·35	2·555	·113
270	247·12	2·717	−0·049	20·59	2·556	·213	248·38	2·390	·106
300	277·01	2·610	·176	50·70	2·430	·203	278·40	2·247	·073
330	307·07	2·534	·250	80·76	2·349	·145	308·38	2·152	−0·026
0	337·22	2·508	−0·259	110·70	2·323	+0·054	338·36	2·119	+0·024

v	(113) *Amalthea* 8^m·4. l	$r\cos b$	$r\sin b$	(114) *Kassandra* 7^m·8. l	$r\cos b$	$r\sin b$	(115) *Thyra* 7^m·8. l	$r\cos b$	$r\sin b$
°	°			°			°		
0	200·20	2·161	+0·186	153·25	2·313	−0·038	43·08	1·883	+0·385
30	230·31	2·185	·184	183·15	2·350	+0·065	73·55	1·937	·327
60	260·36	2·256	·135	213·11	2·455	·158	103·46	2·083	+0·184
90	290·30	2·357	+0·046	243·17	2·619	·220	132·92	2·292	−0·032
120	320·19	2·464	−0·064	273·27	2·811	·228	162·46	2·521	·284
150	350·14	2·545	·164	303·31	2·975	·167	192·54	2·706	·496
180	20·20	2·573	·221	333·25	3·043	+0·050	223·08	2·782	·568
210	50·31	2·541	·214	3·15	2·979	−0·082	253·55	2·713	·458
240	80·36	2·461	·147	33·11	2·815	·182	283·46	2·527	−0·224
270	110·30	2·357	−0·046	63·17	2·619	·220	312·92	2·292	+0·032
300	140·19	2·259	+0·059	93·27	2·453	·199	342·46	2·078	·234
330	170·14	2·188	·141	123·31	2·347	·132	12·54	1·932	·354
0	200·20	2·161	+0·186	153·25	2·313	−0·038	43·08	1·883	+0·385

	(116) *Sirona* 7^m·3.			(118) *Peitho* 8^m·1.			(119) *Althæa* 7^m·5.		
0	152·69	2·366	+0·148	77·90	2·039	+0·141	12·62	2·367	+0·046
30	182·74	2·408	·133	107·91	2·068	·246	42·48	2·391	−0·077
60	212·74	2·528	·083	138·14	2·177	·297	72·43	2·455	·186
90	242·69	2·709	+0·005	168·37	2·358	·276	102·51	2·551	·252
120	272·64	2·916	−0·086	198·36	2·578	+0·171	132·66	2·662	·254
150	302·64	3·087	·164	228·13	2·761	−0·005	162·71	2·756	·182
180	332·69	3·154	·198	257·90	2·826	·196	192·62	2·795	−0·055
210	2·74	3·087	·170	287·91	2·742	·326	222·48	2·760	+0·089
240	32·74	2·916	·096	318·14	2·560	·350	252·43	2·667	·202
270	62·69	2·709	−0·005	348·37	2·358	·276	282·51	2·551	·252
300	92·64	2·528	+0·075	18·36	2·192	−0·146	312·66	2·450	·234
330	122·64	2·408	·128	48·13	2·083	+0·003	342·71	2·387	·158
0	152·69	2·366	+0·148	77·90	2·039	+0·141	12·62	2·367	+0·046

	(120) *Lachesis* 7^m·6.			(122) *Gerda* 7^m·2.			(23) *Brunhild* 8^m·5.		
0	221·91	2·936	−0·310	204·45	3·084	+0·038	69·57	2·352	+0·226
30	252·09	2·950	·362	234·45	3·100	·072	99·56	2·395	+0·130
60	282·28	3·012	·321	264·46	3·144	·088	129·40	2·500	−0·005
90	312·28	3·104	·192	294·47	3·208	·081	159·25	2·650	·153
120	342·10	3·195	−0·003	324·47	3·276	·052	189·26	2·815	·276
150	11·91	3·255	+0·196	354·46	3·327	+0·007	219·42	2·952	·332
180	41·91	3·268	·345	24·45	3·345	−0·041	249·57	3·013	·290
210	72·09	2·237	·397	54·45	3·326	·077	279·56	2·967	−0·161
240	102·28	3·177	·338	84·46	3·275	·092	309·40	2·828	+0·006
270	132·28	3·104	·192	114·47	3·208	·081	339·25	2·650	·153
300	162·10	3·029	+0·003	144·47	3·145	·050	9·26	2·488	·244
330	191·91	2·967	−0·178	174·46	3·100	−0·006	39·42	2·383	·268
0	221·91	2·936	−0·310	204·45	3·084	+0·038	69·57	2·352	+0·226

v	(117) *Lomia* $7^m{\cdot}5$. l	$r\cos b$	$r\sin b$	(121) *Hermione* $6^m{\cdot}6$. l	$r\cos b$	$r\sin b$	(129) *Antigone* $6^m{\cdot}6$. l	$r\cos b$	$r\sin b$
°	°			°			°		
0	47·88	2·850	+0·647	357·93	2·995	−0·393	242·38	2·210	+0·457
15	63·23	2·833	·726	13·04	3·010	·361	257·62	2·232	·417
30	78·76	2·832	·755	28·09	3·051	·306	272·71	2·285	·348
45	94·24	2·849	·737	43·08	3·114	·231	287·63	2·366	·255
60	109·61	2·879	·666	58·00	3·196	·138	302·40	2·470	·140
75	124·75	2·920	·551	72·88	3·292	−0·030	317·08	2·594	+0·005
90	139·62	2·963	·396	87·75	3·398	+0·086	331·75	2·733	−0·144
105	154·27	3·000	·212	102·64	3·507	·205	346·51	2·881	·300
120	168·82	3·024	+0·012	117.59	3·614	.316	1·41	3·029	·452
135	183·30	3·032	−0·191	132·60	3·708	·410	16·49	3·168	·584
150	197·93	3·025	·383	147·68	3·783	·478	31·72	3·285	·681
165	212·77	3·007	·549	162·81	3·834	·511	47·16	3·367	·726
180	227·88	2·983	·678	177·93	3·854	·506	62·38	3·403	·709
195	243·23	2·961	·759	193·04	3·840	·460	77·62	3·386	·632
210	258·76	2·946	·787	208·09	3·794	·381	92·71	3·316	·505
225	274·24	2·942	·761	223·08	3·720	·276	107·63	3·203	·345
240	289·61	2·946	·682	238·00	3·624	·156	122·40	3·057	·173
255	304·75	2·955	·557	252·88	3·513	+0·032	137·08	2·896	−0·006
270	319·62	2·963	·396	267·75	3·398	−0·086	151·75	2·733	+0·144
285	334·27	2·964	·210	282·64	3·287	·192	166·81	2·580	·269
300	348·82	2·955	−0·011	297·59	3·186	·278	181·41	2·447	·365
315	3·30	2·937	+0·185	312·60	3·103	·343	196·49	2·340	·432
330	17·93	2·908	·368	327·68	3·042	·384	211·72	2·263	·469
345	32·77	2·877	·526	342·81	3·005	·401	227·16	2·220	·478
0	47·88	2·850	+0·647	357·93	2·995	−0·393	242·38	2·210	+0·457
	(124) *Alkeste* $7^m{\cdot}1$.			(125) *Liberatris* $7^m{\cdot}8$.			(126) *Velleda* $8^m{\cdot}8$.		
0	246·86	2·427	+0·106	275·84	2·523	+0·196	347·94	2·180	−0·065
30	276·89	2·449	·125	305·88	2·551	·142	17·91	2·209	−0·011
60	306·93	2·516	·113	335·83	2·624	+0·050	47·88	2·286	+0·049
90	336·93	2·614	·070	5·74	2·725	−0·062	77·87	2·410	·101
120	6·90	2·720	+0·003	35·69	2·831	·166	107·90	2·544	·130
150	36·86	2·801	−0·069	65·74	2·912	·229	137·93	2·654	·124
180	66·86	2·830	·124	95·84	2·945	·229	167·94	2·698	·080
210	96·89	2·798	·143	125·88	2·917	·162	197·91	2·657	+0·013
240	126·93	2·717	·122	155·83	2·835	−0·054	227·88	2·547	−0·054
270	156·93	2·614	·070	185·74	2·725	+0·062	257·87	2·410	·101
300	186·90	2·519	−0·003	215·69	2·620	·154	287·90	2·288	·117
330	216·86	2·453	+0·060	245·74	2·547	·201	317·93	2·207	·103
0	246·86	2·427	+0·106	275·84	2·523	+0·196	347·94	2·180	−0·065

v	(127) *Johanna* $7^m{\cdot}1$. l	$r\cos b$	$r\sin b$	(128) *Nemesis* $7^m{\cdot}2$. l	$r\cos b$	$r\sin b$	(133) *Cyrene* $7^m{\cdot}3$. l	$r\cos b$	$r\sin b$
°	°			°			°		
0	119·98	2·545	+0·370	16·07	2·385	−0·228	247·03	2·613	−0·319
30	150·25	2·573	·329	46·08	2·430	·135	277·14	2·666	·235
60	180·26	2·652	·202	75·93	2·541	−0·003	307·02	2·803	−0·087
90	210·01	2·745	+0·012	105.78	2·702	+0·145	336·79	3·000	+0·103
120	239·75	2·833	−0·193	135·78	2·879	·272	6·68	3·215	·291
150	269·73	2·892	·357	165·92	3·028	·332	36·80	3·391	·417
180	299·98	2·910	·423	196·07	3·092	·295	67·03	3·465	·423
210	330·25	2·889	·370	226·08	3·041	·169	97·14	3·403	·300
240	0·26	2·831	·215	255·93	2·892	+0·003	127·02	3·226	+0·100
270	30·01	2·745	−0·012	285·78	2·702	−0·145	156·79	3·000	−0·103
300	59·75	2·654	+0·181	315·78	2·530	·239	186·68	2·793	·253
330	89·73	2·574	·318	345·92	2·419	·266	216·80	2·656	·326
0	119·98	2·545	+0·370	16·07	2·385	−0·228	247·03	2·613	−0·319

	(130) *Elektra* $6^m{\cdot}5$.			(137) *Melibœa* $7^m{\cdot}4$.			(148) *Gallia* $7^m{\cdot}5$.		
0	18·46	2·331	−0·783	309·44	2·403	+0·548	34·25	2·064	−0·913
15	34·13	2·303	0·905	324·72	2·430	·493	50·68	2·052	0·969
30	50·26	2·321	0·978	339·81	2·491	·409	67·25	2·092	0·969
45	66·53	2·393	0·996	354·80	2·581	·296	83·47	2·182	0·911
60	82·56	2·520	0·954	9·41	2·696	+0·157	99·01	2·317	0·792
75	98·05	2·695	0·847	24·02	2·832	−0·004	113·76	2·478	0·613
90	112·90	2·903	0·670	38·64	2·982	·182	127·84	2·649	0·375
105	127·20	3·124	0·425	53·36	3·139	·368	141·51	2·809	−0·086
120	141·12	3·330	−0·119	68·25	3·296	·548	155·09	2·939	+0·239
135	154·95	3·497	+0·231	83·36	3·443	·704	168·91	3·024	0·576
150	168·96	3·600	0·596	98·65	3·567	·816	183·27	3·059	0·893
165	183·41	3·627	0·934	114·04	3·656	·866	198·38	3·047	1·155
180	198·46	3·583	1·203	129·44	3·696	·842	214·25	3·003	1·329
195	214·13	3·486	1·370	144·72	3·682	·747	230·68	2·946	1·392
210	230·26	3·362	1·416	159·81	3·611	·593	247·25	2·891	1·340
225	246·53	3·235	1·346	174·80	3·491	·401	263·47	2·841	1·186
240	262·56	3·116	1·180	189·41	3·336	−0·195	279·01	2·790	0·954
255	278·05	3·007	0·945	204·02	3·161	+0·004	293·76	2·728	0·675
270	292·90	2·903	0·670	218·64	2·982	·182	307·84	2·649	0·375
285	307·20	2·799	0·381	233·36	2·813	·330	321·51	2·552	+0·078
300	321·12	2·693	+0·096	248·25	2·665	·443	335·09	2·440	−0·198
315	334·95	2·586	−0·171	263·36	2·545	·520	348·91	2·323	0·442
330	348·96	2·484	0·411	278·65	2·460	·563	3·27	2·213	0·646
345	3·41	2·396	0·617	294·04	2·413	·571	18·38	2·122	0·805
0	18·46	2·331	−0·783	309·44	2·403	+0·548	34·25	2·064	−0·913

	(134) *Sophrosyne* $8^{m}\cdot1$.			(135) *Hertha* $7^{m}\cdot8$.			(136) *Austria* $8^{m}\cdot9$.		
v	l	$r\cos b$	$r\sin b$	l	$r\cos b$	$r\sin b$	l	$r\cos b$	$r\sin b$
°	°			°			°		
0	66·89	2·218	+0·449	319·82	1·931	−0·032	316·50	2·075	+0·266
30	97·48	2·254	·431	349·80	1·977	+0·008	346·36	2·111	+0·120
60	127·66	2·369	·304	19·78	2·110	·050	15·97	2·157	−0·063
90	157·27	2·527	+0·081	49·79	2·325	·086	45·71	2·257	·242
120	186·69	2·680	−0·192	79·81	2·589	·104	75·84	2·341	·370
150	216·50	2·781	·438	109·83	2·826	·092	106·24	2·417	·401
180	246·89	2·809	·569	139·82	2·924	+0·048	136·50	2·460	·316
210	277·48	2·765	·529	169·80	2·827	−0·012	166·36	2·446	−0·139
240	307·66	2·665	·341	199·78	2·591	·061	195·97	2·369	+0·068
270	337·27	2·527	−0·081	229·79	2·325	·086	225·71	2·257	·242
300	6·69	2·382	+0·170	259·81	2·109	·085	255·84	2·151	·340
330	36 50	2·267	·357	289·83	1·976	·064	286·24	2·086	·346
0	66·89	2·218	+0·449	319·82	1·931	−0·032	316·50	2·075	+0·266

	(153) *Hilda* $7^{m}\cdot3$.			(154) *Bertha* $7^{m}\cdot0$.			(164) *Eva* $8^{m}\cdot3$.		
0	285·53	3·250	+0·380	191·71	2·904	+0·484	0·69	1·571	−0·694
15	300·63	3·260	·432	205·93	2·943	+0·226	16·77	1·612	0·638
30	315·76	3·306	·459	219·96	2·973	−0·050	32·22	1·694	0·546
45	330·90	3·388	·460	234·03	2·991	0·327	46·94	1·811	0·418
60	346·01	3·505	·431	248·38	2·998	0·591	61·05	1·956	0·251
75	1·06	3·653	·373	263·18	3·001	0·824	74·80	2·123	−0·045
90	16·03	3·825	·284	278·51	3·011	1·010	88·49	2·306	+0·200
105	30·94	4·011	·167	294·29	3·037	1·134	102·43	2·497	0·478
120	45·81	4·196	+0·026	310·33	3·087	1·182	116·89	2·691	0·776
135	60·67	4·365	−0·130	326·31	3·161	1·147	132·05	2·877	1·064
150	75·56	4·498	·286	341·95	3·250	1·027	147·91	3·042	1·301
165	90·51	4·580	·427	357·09	3·336	0·829	164·25	3·171	1·437
180	105·53	4·601	·538	11·71	3·398	0·566	180·69	3·242	1·433
195	120·63	4·560	·604	25·93	3·427	−0·263	196·77	3·237	1·281
210	135·76	4·464	·620	39·96	3·407	+0·057	212·22	3·149	1·015
225	150·90	4·327	·587	54·03	3·343	0·366	226·94	2·989	0·689
240	166·01	4·165	·513	68·38	3·244	0·639	241·05	2·778	0·356
255	181·06	3·993	·408	83·18	3·126	0·858	254·80	2·542	+0·054
270	196·03	3·825	·284	98·51	3·011	1·010	268·49	2·306	−0·200
285	210·94	3·668	·152	114·29	2·916	1·089	282·43	2·086	0·399
300	225·81	3·531	−0·022	130·33	2·854	1·093	296·89	1·895	0·546
315	240·67	3·418	+0·101	146·31	2·828	1·026	312·05	1·743	0·645
330	255·56	3·331	·212	161·95	2·835	0·896	327·91	1·636	0·700
345	270·51	3·274	·306	177·09	2 865	0·712	344·25	1·579	0·715
0	285·53	3·250	+0·380	191·71	2·904	+0·484	0·69	1·571	−0·694

	(138) *Tolosa* 9m·1.			(143) *Adria* 9m·0.			(147) *Protogeneia* 8m·4.		
v	*l*	*r* cos *b*	*r* sin *b*	*l*	*r* cos *b*	*r* sin *b*	*l*	*r* cos *b*	*r* sin *b*
°	°			°			°		
0	311·67	2·053	−0·113	221·01	2·518	−0·472	27·21	3·054	+0·070
30	341·72	2·092	·113	251·58	2·534	·510	57·21	3·066	+0·025
60	11·74	2·207	·085	281·98	2·618	·417	87·19	3·095	−0·028
90	41·71	2·387	−0·030	311·82	2.740	−0·207	117·18	3·137	·075
120	71·67	2·596	+0·042	341·27	2·850	+0·076	147·19	3·179	·102
150	101·65	2·772	·114	10·86	2·909	·357	177·21	3·211	·102
180	131·67	2·841	·156	41·01	2·911	·546	207·21	3·224	·074
210	161·72	2·770	·149	71·58	2·874	·578	237·21	3·213	−0·026
240	191·74	2·594	·100	101·98	2·815	·449	267·19	3·180	+0·029
270	221·71	2·387	+0·030	131·82	2·740	+0·207	297·18	3·137	·075
300	251·67	2·209	−0·036	161·27	2·650	−0·071	327·19	3·094	·100
330	281·65	2·093	·086	190·86	2·566	·315	357·21	3·064	·098
0	311·67	2·053	−0·113	221·01	2·518	−0·472	27·21	3·054	+0·070
	(173) *Ino* 7m·6.			(176) *Idunna* 8m·0.			(181) *Eucharis* 7m·0.		
0	12·80	2·143	−0·380	20·85	2·666	+0·007	96·94	2·359	−0·588
15	27·91	2·139	·468	34·75	2·666	−0·259	111·84	2·407	0·440
30	43·24	2·164	·531	48·91	2·668	0·515	126·36	2·478	0·263
45	58·70	2·221	·565	63·56	2·678	0·748	140·65	2·567	−0·062
60	74·15	2·312	·566	78·81	2·707	0·948	154·88	2·669	+0·158
75	89·48	2·436	·531	94·62	2·767	1·100	169·24	2·781	0·388
90	104·59	2·586	·456	110·80	2·867	1·189	183·91	2·904	0·617
105	119·46	2·754	·340	126·98	3·011	1·202	198·98	3·038	0·829
120	134·13	2·923	−0·185	142·82	3·189	1·126	214·44	3·183	1·004
135	148·69	3·075	+0·002	158·10	3·379	0·957	230·19	3·336	1·118
150	163·25	3·191	·206	172·77	3·551	0·701	246·00	3·487	1·150
165	177·92	3·255	·406	186·95	3·671	0·375	261·64	3·615	1·084
180	192·80	3·259	·578	200·85	3·715	−0·009	276·94	3·698	0·921
195	207·91	3·205	·701	214·75	3·673	+0·357	291·84	3·713	0·678
210	223·24	3·106	·762	228·91	3·554	0·685	306·36	3·651	0·387
225	238·70	2·974	·758	243·56	3·383	0·945	320·65	3·517	+0·084
240	254·15	2·845	·696	258·81	3·192	1·118	334·88	3·332	−0·197
255	269·48	2·711	·591	274·62	3·013	1·197	349·24	3·118	0·435
270	284·59	2·586	·456	290·80	2·867	1·189	3·91	2·904	0·617
285	299·46	2·474	·305	306·98	2·766	1·104	18·98	2·709	0·739
300	314·13	2·376	+0·150	322·82	2·705	0·955	34·44	2·549	0·804
315	328·69	2·292	−0·002	338·10	2·676	0·758	50·19	2·434	0·816
330	343·25	2·223	·144	352·77	2·666	0·526	66·00	2·366	0·781
345	357·92	2·173	·271	6·95	2·665	0·272	81·64	2·343	0·703
0	12·80	2·143	−0·380	20·85	2·666	+0·007	96·94	2·359	−0·588

	(158) *Koronis* 8m·7.			(179) *Klytæmnestra* 7m·6.			(207) *Hedda* 9m·5.		
v	*l*	*r* cos *b*	*r* sin *b*	*l*	*r* cos *b*	*r* sin *b*	*l*	*r* cos *b*	*r* sin *b*
°	°			°			°		
0	58·83	2·718	+0·032	355·22	2·625	+0·352	217·02	2·215	−0·021
30	88·83	2·737	+0·010	25·38	2·671	·271	246·97	2·222	·092
60	118·82	2·788	−0·015	55·27	2·784	+0·118	276·99	2·244	·139
90	148·82	2·862	·037	85·01	2·937	−0·082	307·05	2·277	·151
120	178·82	2·939	·050	114·85	3·095	·281	337·10	2·313	·121
150	208·83	2·998	·050	144·96	3·218	.418	7·07	2·342	−0·058
180	238·83	3·021	·035	175·22	3·269	·438	37·02	2·352	+0·022
210	268·83	2·999	−0·011	205·38	3·229	·328	66·97	2·341	·097
240	298·82	2·939	+0·016	235·27	3·105	−0·131	96·99	2·312	·143
270	328·82	2·862	·037	265·01	2·937	+0·082	127·05	2·277	·151
300	358·82	2·788	·047	294·85	2·775	·252	157·10	2·245	·118
330	28·83	2·736	·045	324·96	2·662	·346	187·07	2·223	+0·055
0	58·83	2·718	+0·032	355·22	2·625	+0·352	217·02	2·215	−0·021
	(185) *Eunike* 7m·0.			(186) *Celuta* 8m·9.			(190) *Ismene* 6m·7.		
0	12·68	2·307	−0·622	327·92	1·979	−0·337	105·75	3·285	−0·333
15	27·81	2·265	0·788	342·84	2·002	·246	120·80	3·306	·294
30	43·56	2·250	0·907	357·59	2·039	·139	135·81	3·357	·237
45	59·75	2·271	0·973	12·22	2·087	−0·020	150·78	3·440	·163
60	76·05	2·335	0·980	26·83	2·145	+0·107	165·72	3·551	−0·074
75	92·06	2·439	0·923	41·53	2·210	·234	180·63	3·686	+0·025
90	107·50	2·572	0·799	56·40	2·281	·356	195·55	3·839	·131
105	122·28	2·718	0·610	71·46	2·357	·462	210·50	4·004	·237
120	136·51	2·853	0·364	86·71	2·436	·543	225·49	4·170	·334
135	150·38	2·959	−0·076	102·09	2·514	·588	240·52	4·323	·414
150	164·18	3·022	+0·234	117·48	2·586	·590	255·59	4·450	·467
165	178·20	3·024	0·537	132·79	2·643	·545	270·67	4·534	·485
180	192·68	2·980	0·804	147·92	2·677	·456	285·75	4·569	·463
195	207·81	2·901	1·008	162·84	2·679	·330	300·80	4·542	·404
210	223·56	2·808	1·132	177·59	2·646	·181	315·81	4·464	·315
225	239·75	2·721	1·166	192·22	2·582	+0·025	330·78	4·339	·205
240	256·05	2·652	1·114	206·83	2·492	−0·124	345·72	4·183	+0·088
255	272·06	2·605	0·986	221·53	2·388	·253	0·63	4·011	−0·027
270	287·50	2·572	0·799	236·40	2·281	·356	15·55	3·839	·131
285	302·28	2·544	0·571	251·46	2·181	·427	30·50	3·679	·217
300	316·51	2·512	0·321	266·71	2·096	·467	45·49	3·540	·284
315	330·38	2·470	+0·063	282·09	2·033	·475	60·52	3·428	·329
330	344·18	2·422	−0·187	297·48	1·992	·454	75·59	3·347	·351
345	358·20	2·362	0·419	312·79	1·975	·407	90·67	3·300	·353
0	12·68	2·307	−0·622	327·92	1·979	−0·337	105·75	3·285	−0·333

(To be continued.)